

FIG. 1

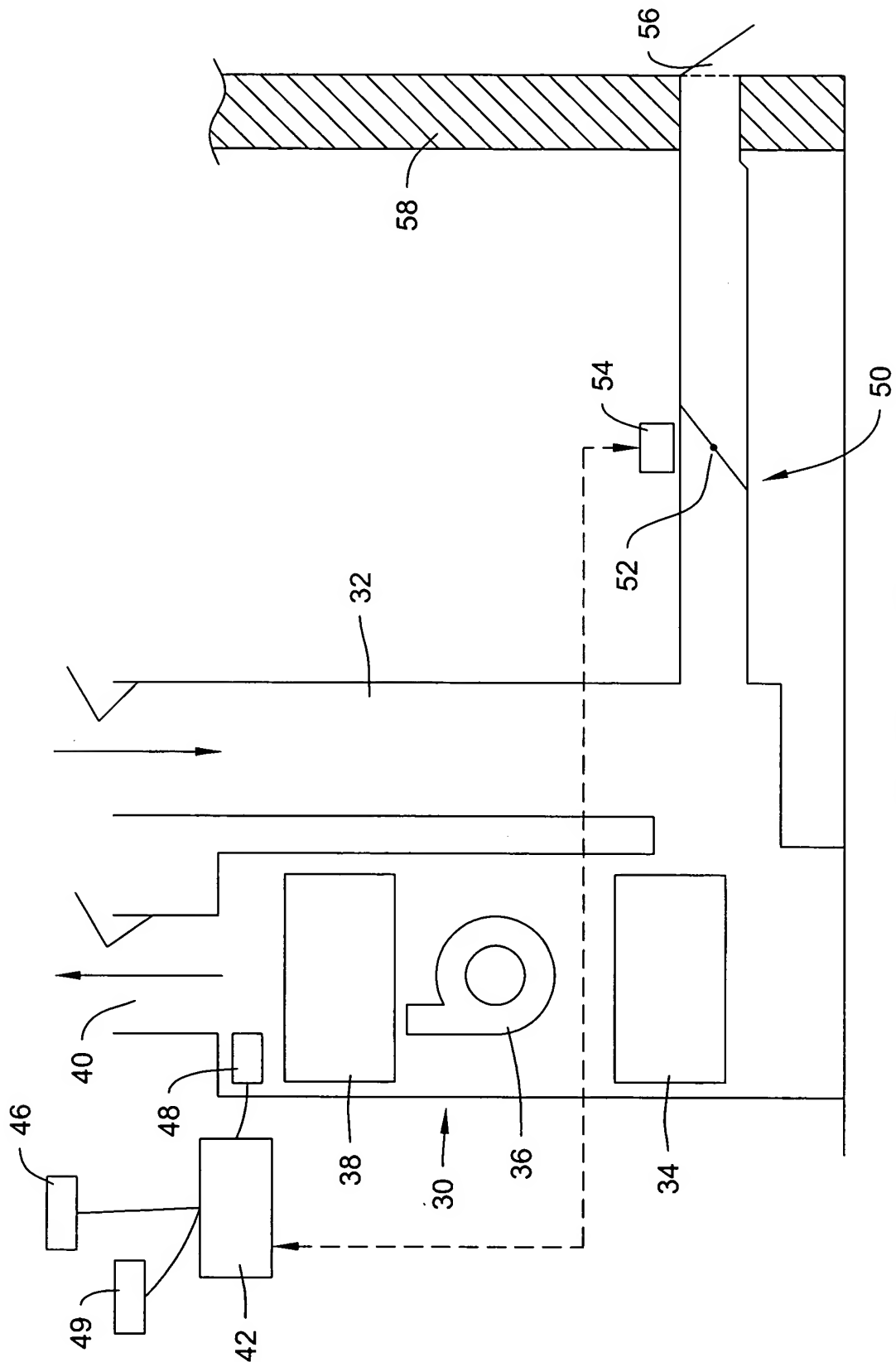


FIG. 2

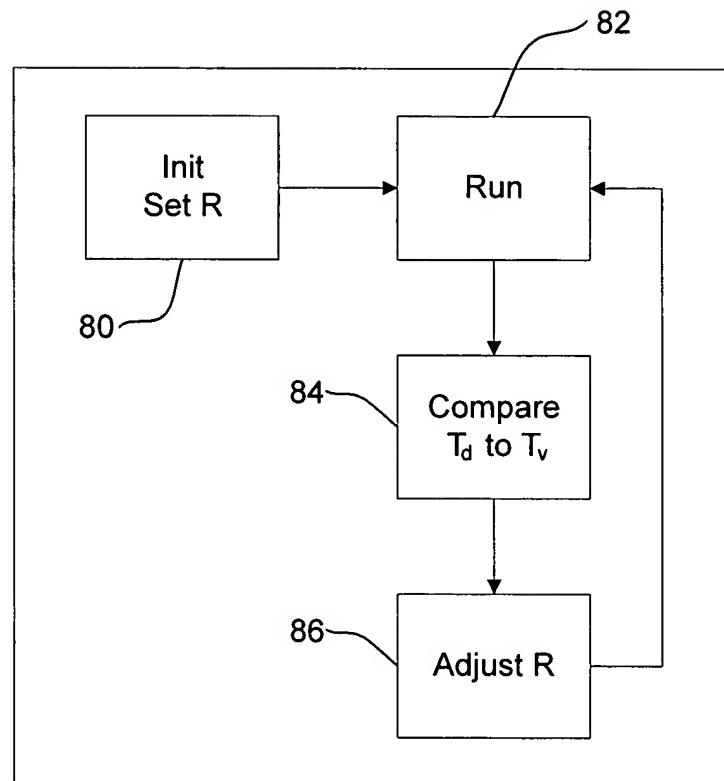


FIG. 3

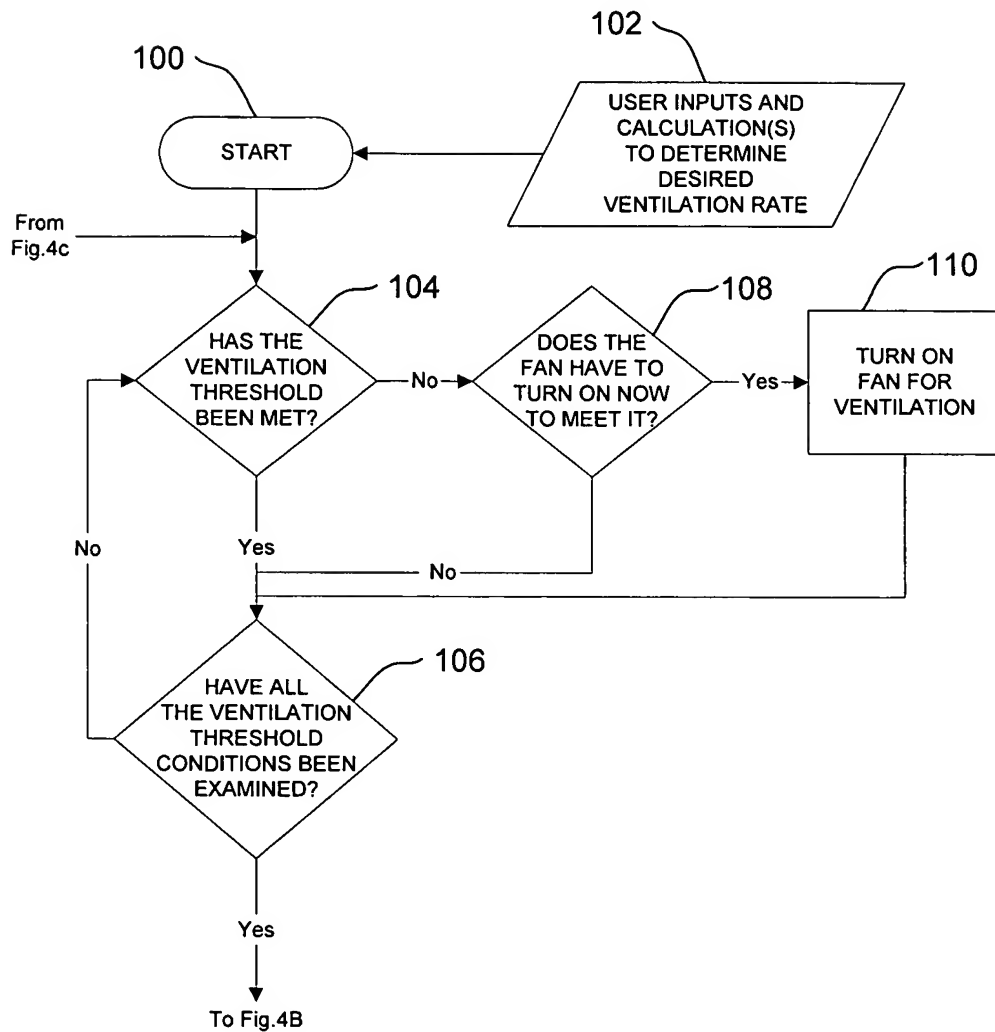


FIG. 4A

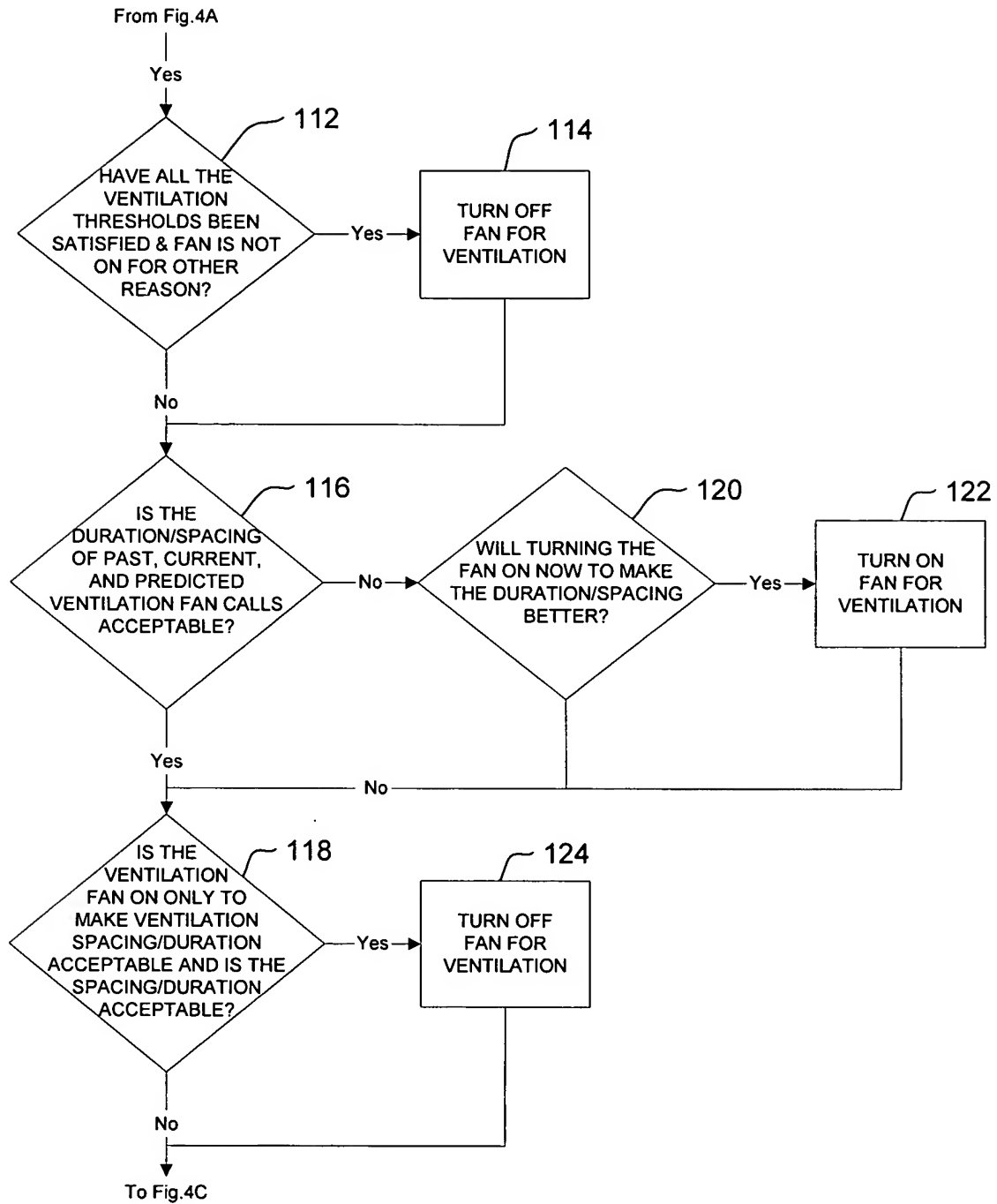


FIG. 4B

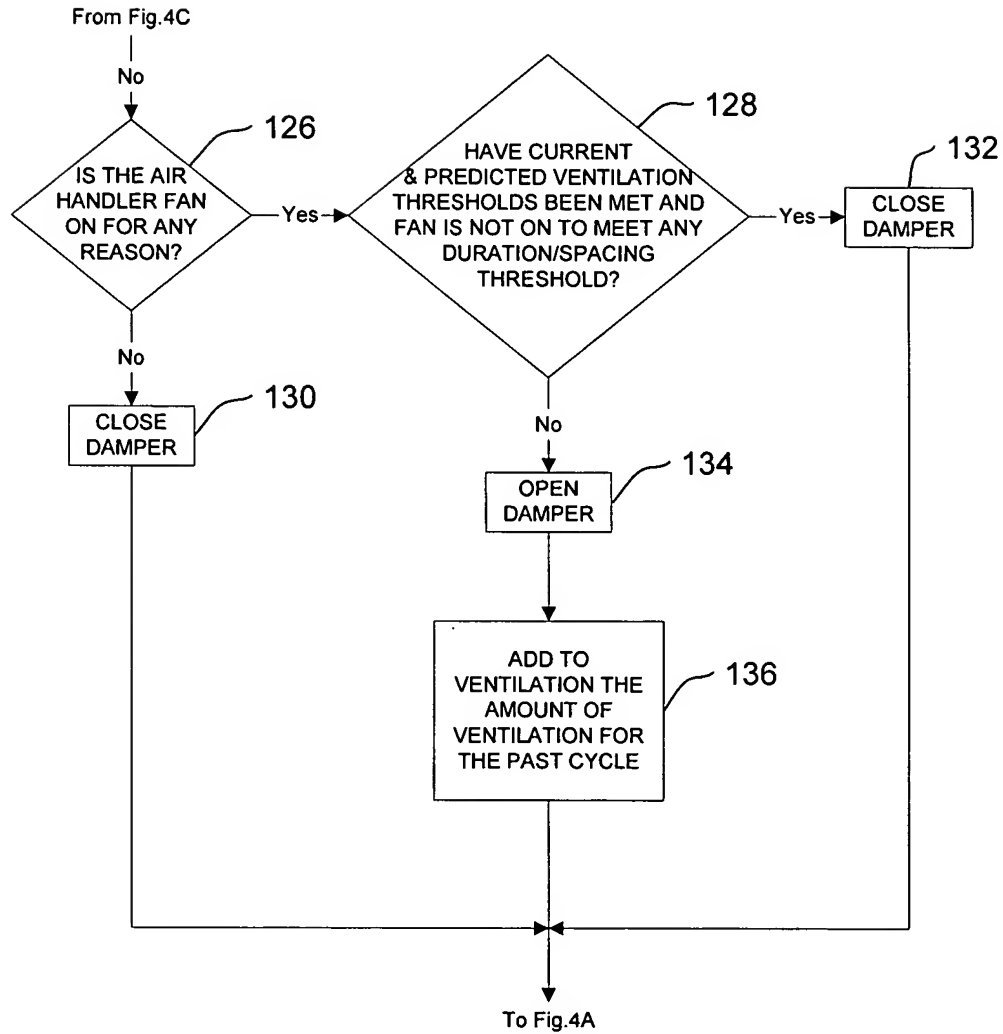


FIG. 4C

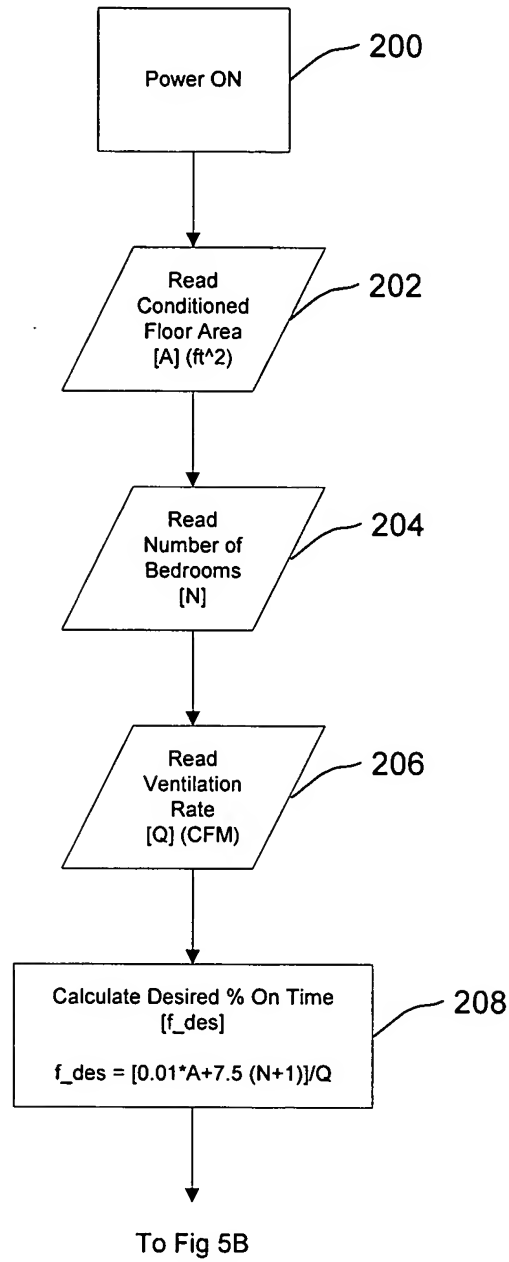


FIG. 5A

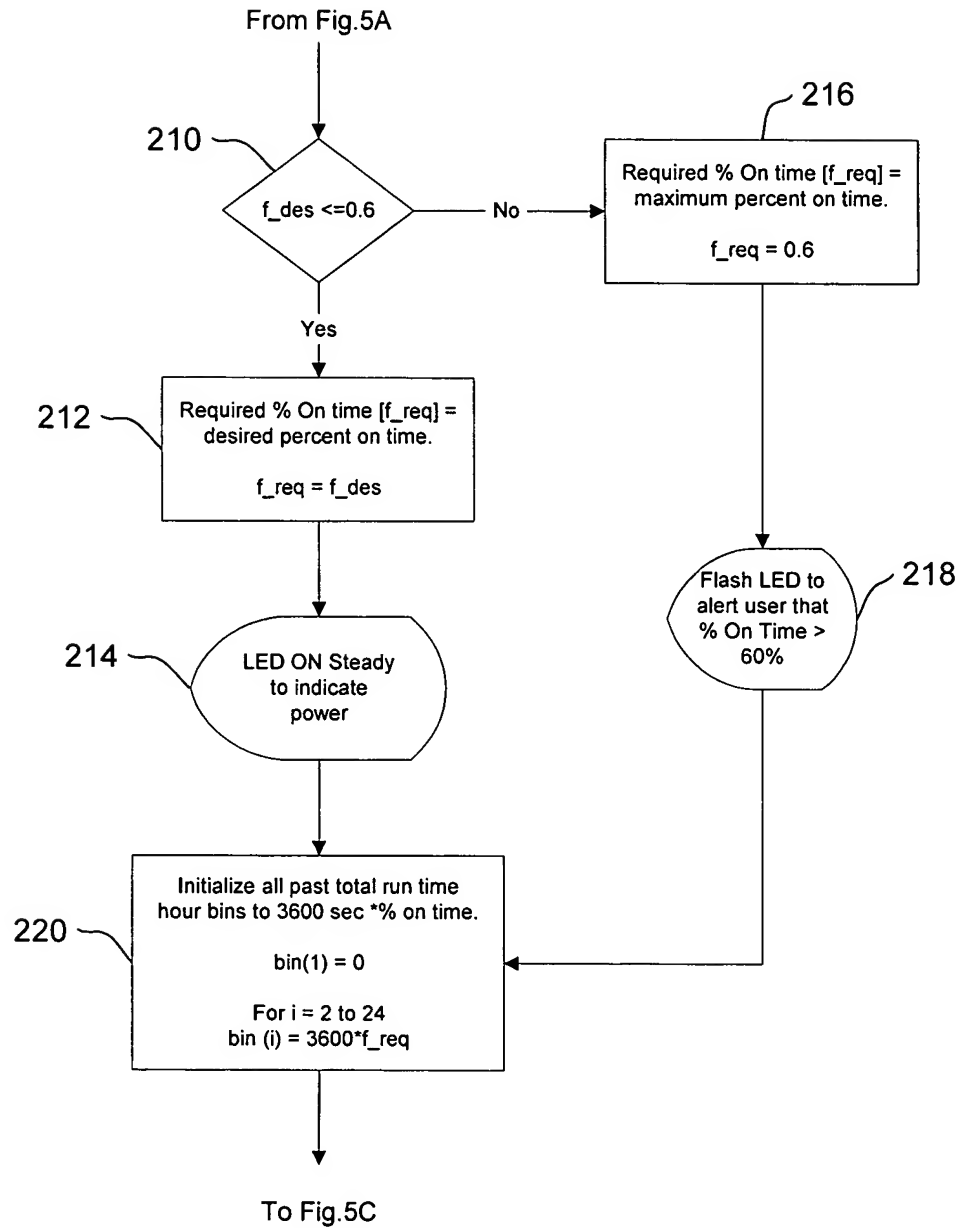


FIG. 5B

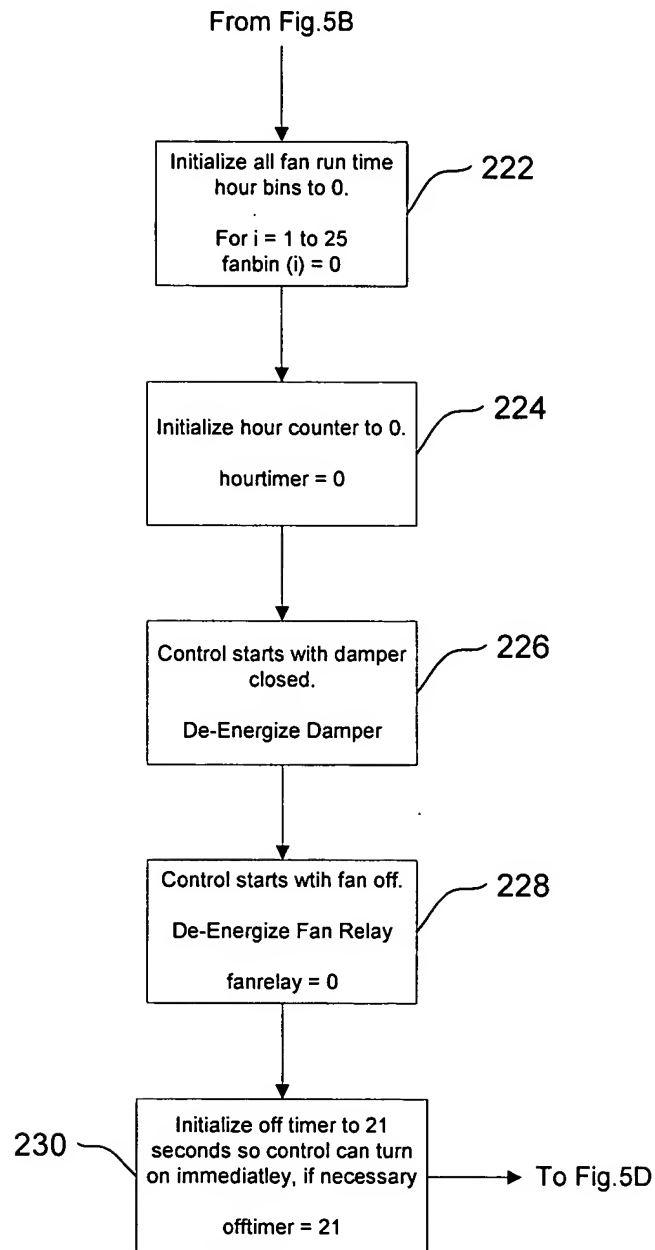


FIG. 5C

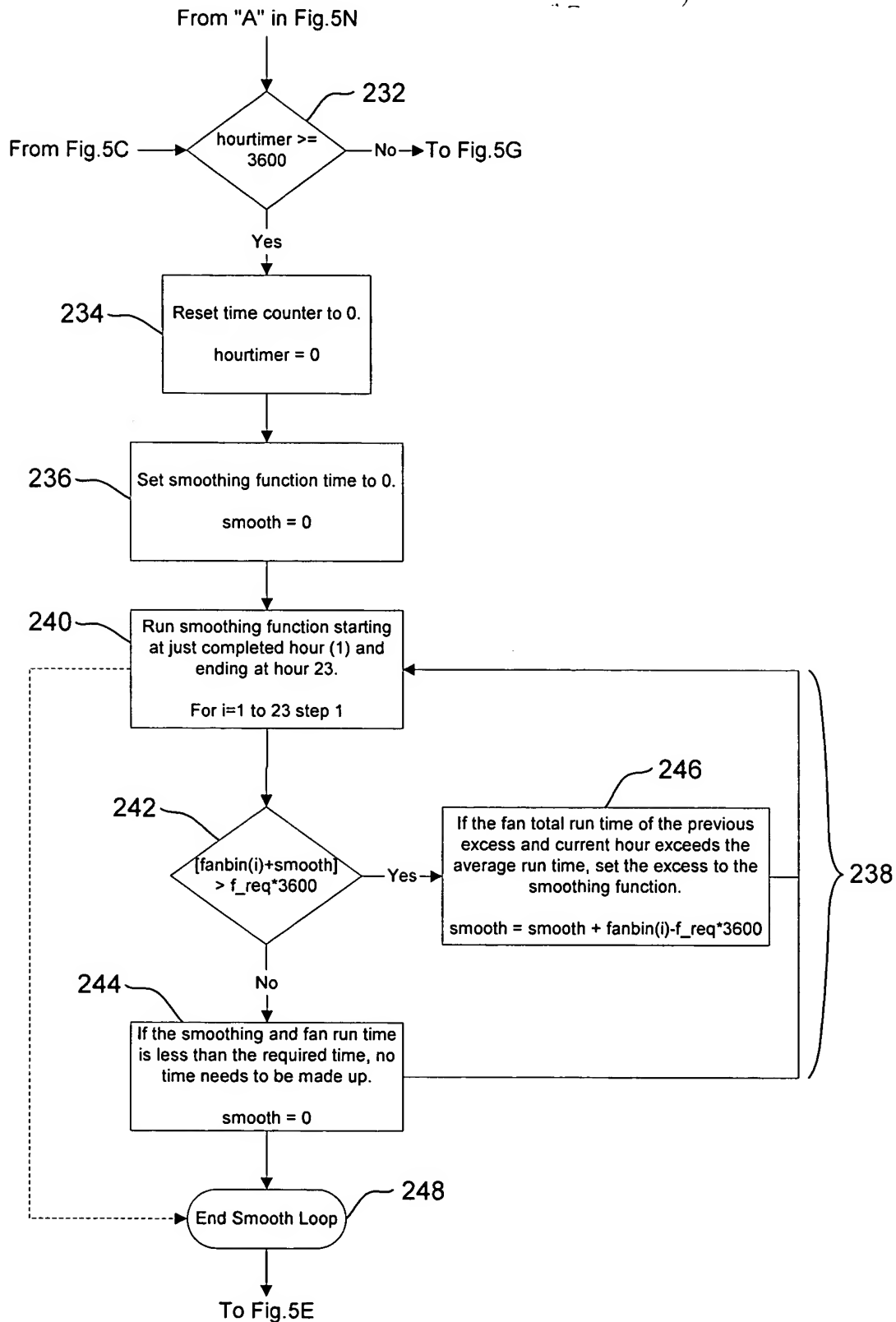


FIG. 5D

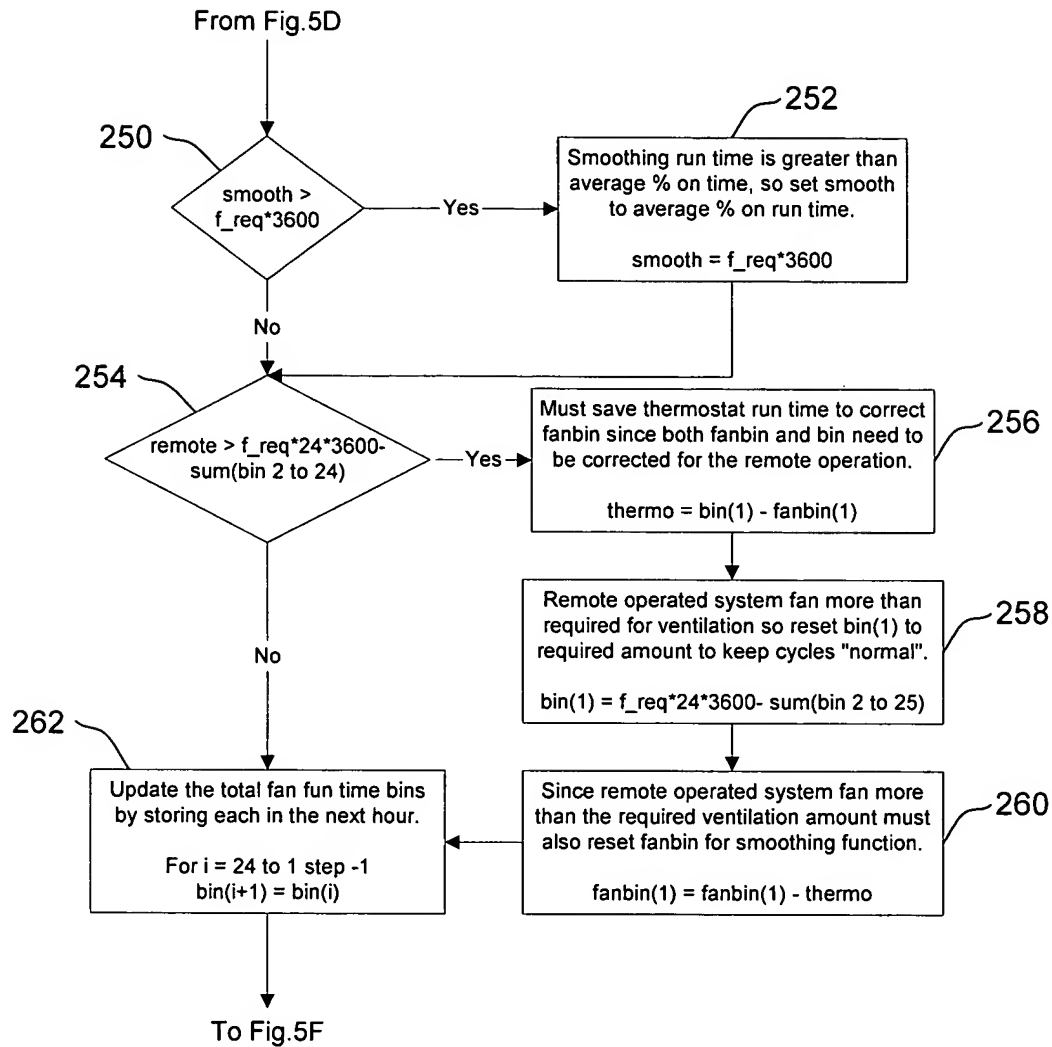


FIG. 5E

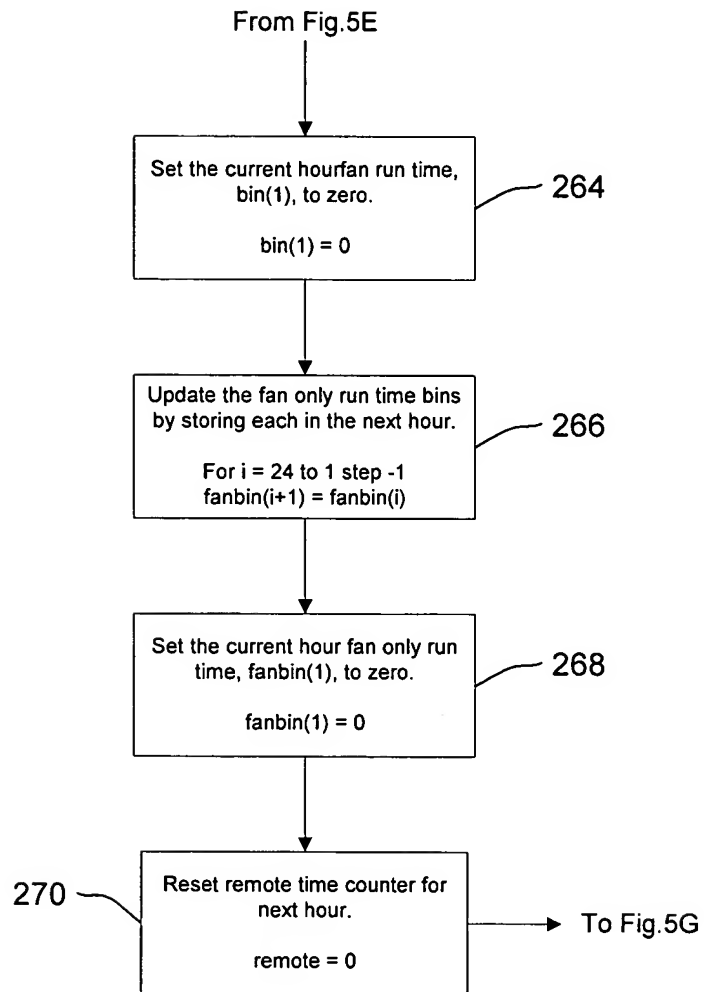


FIG. 5F

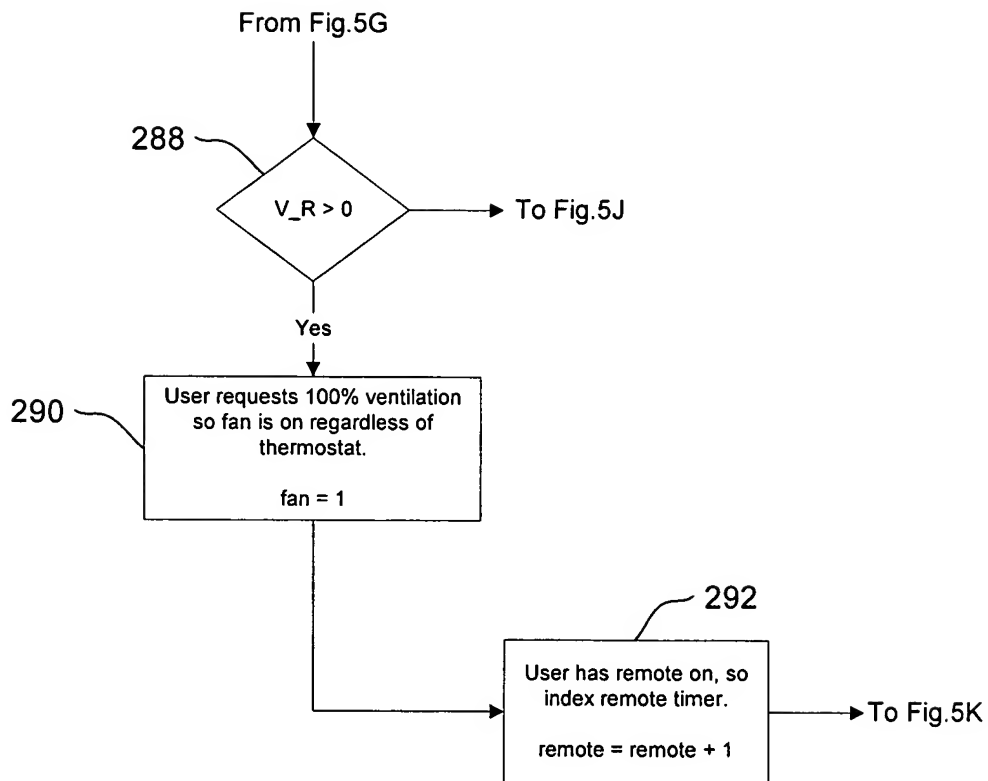


FIG. 5H

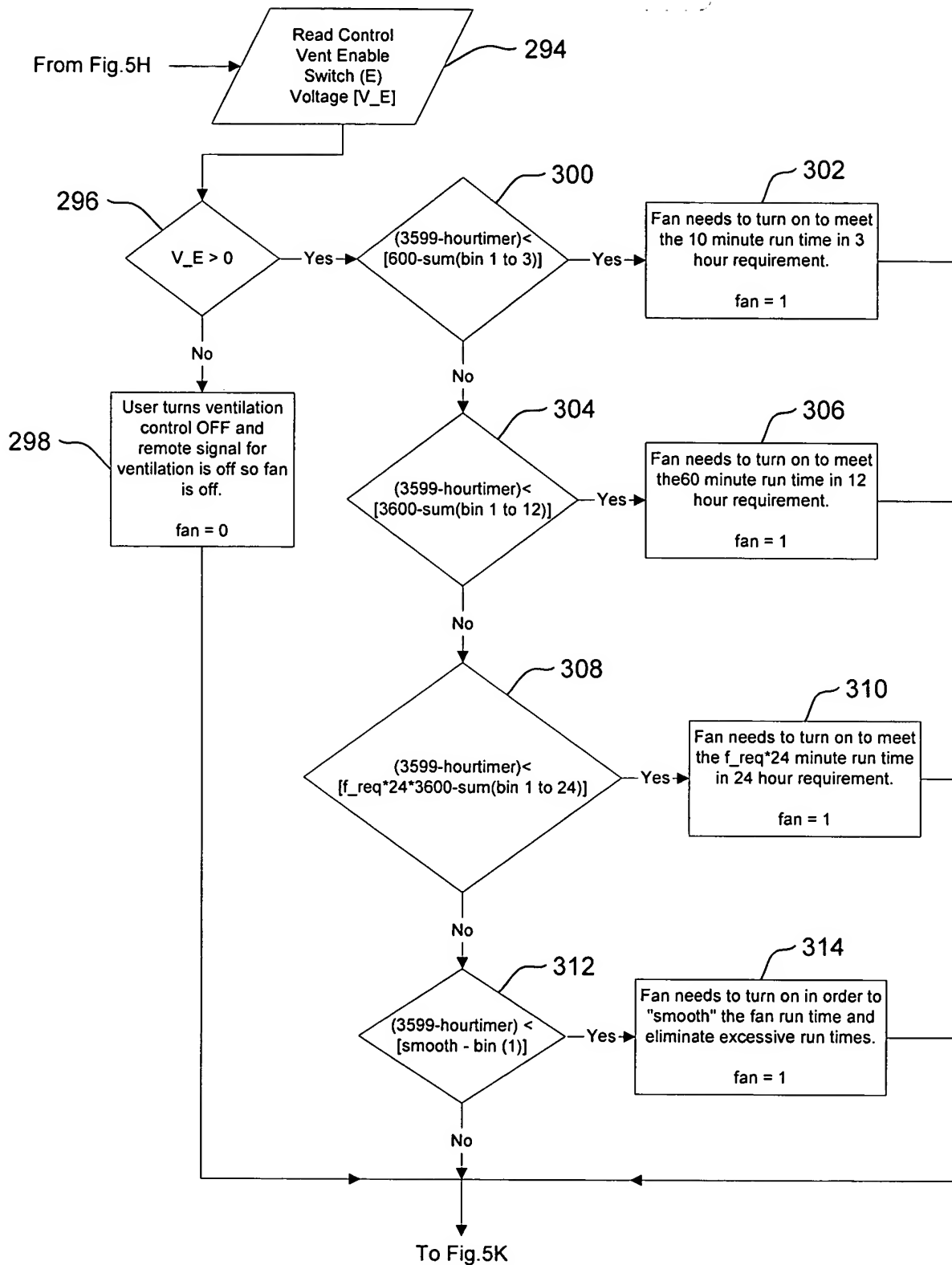


FIG. 5J

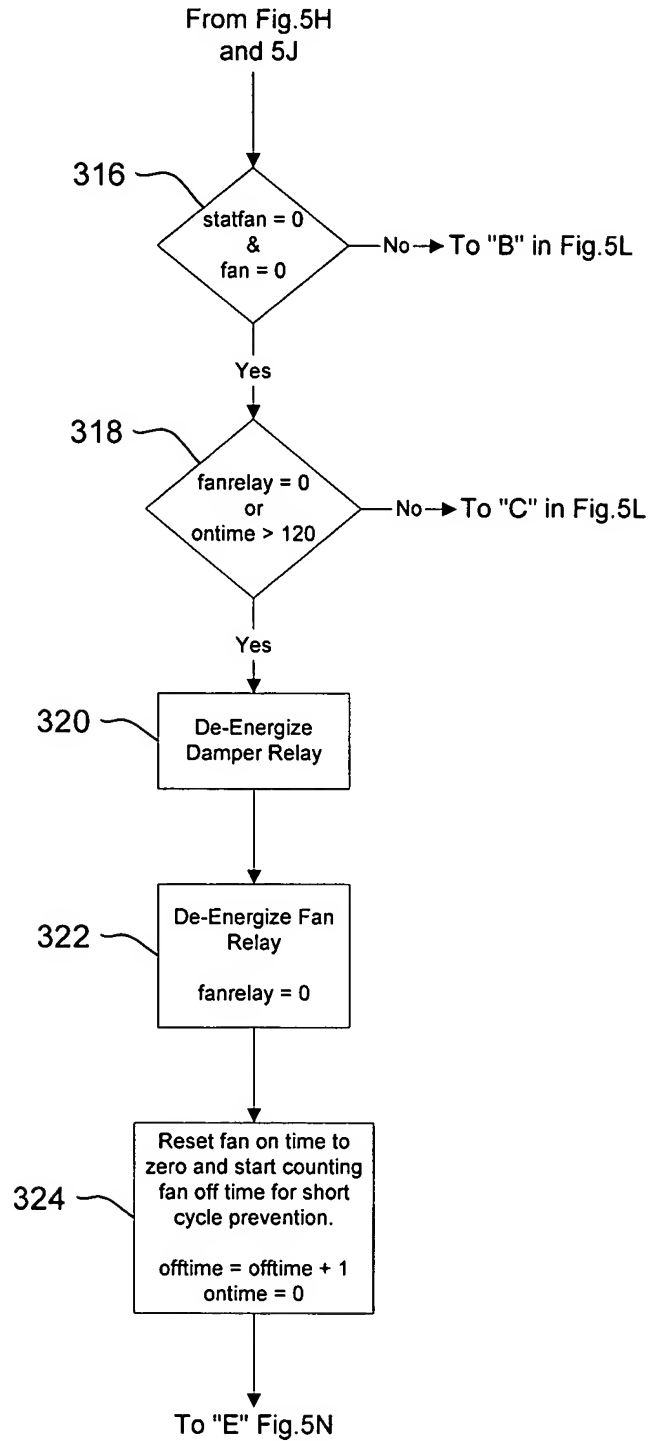


FIG. 5K

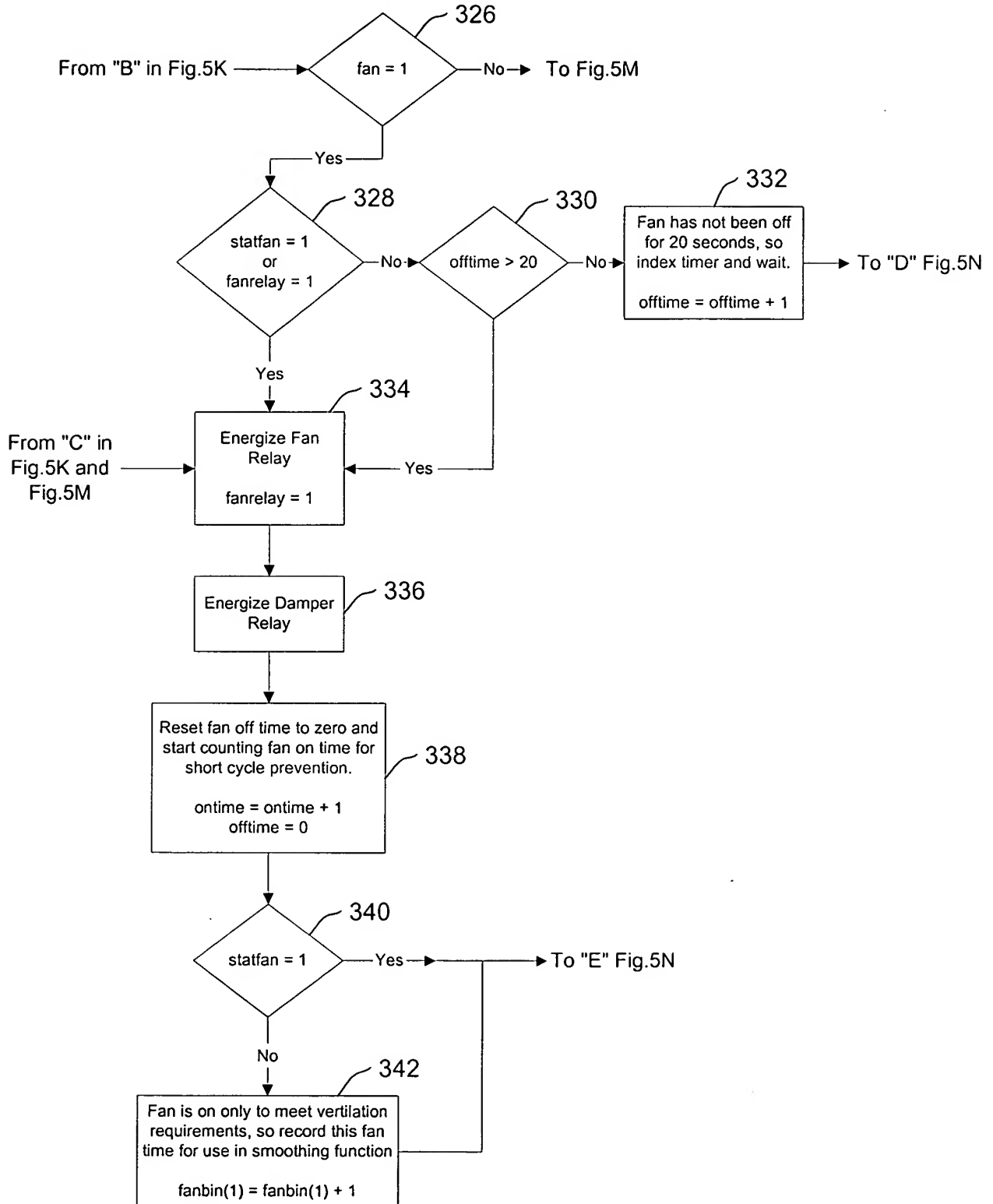


FIG. 5L

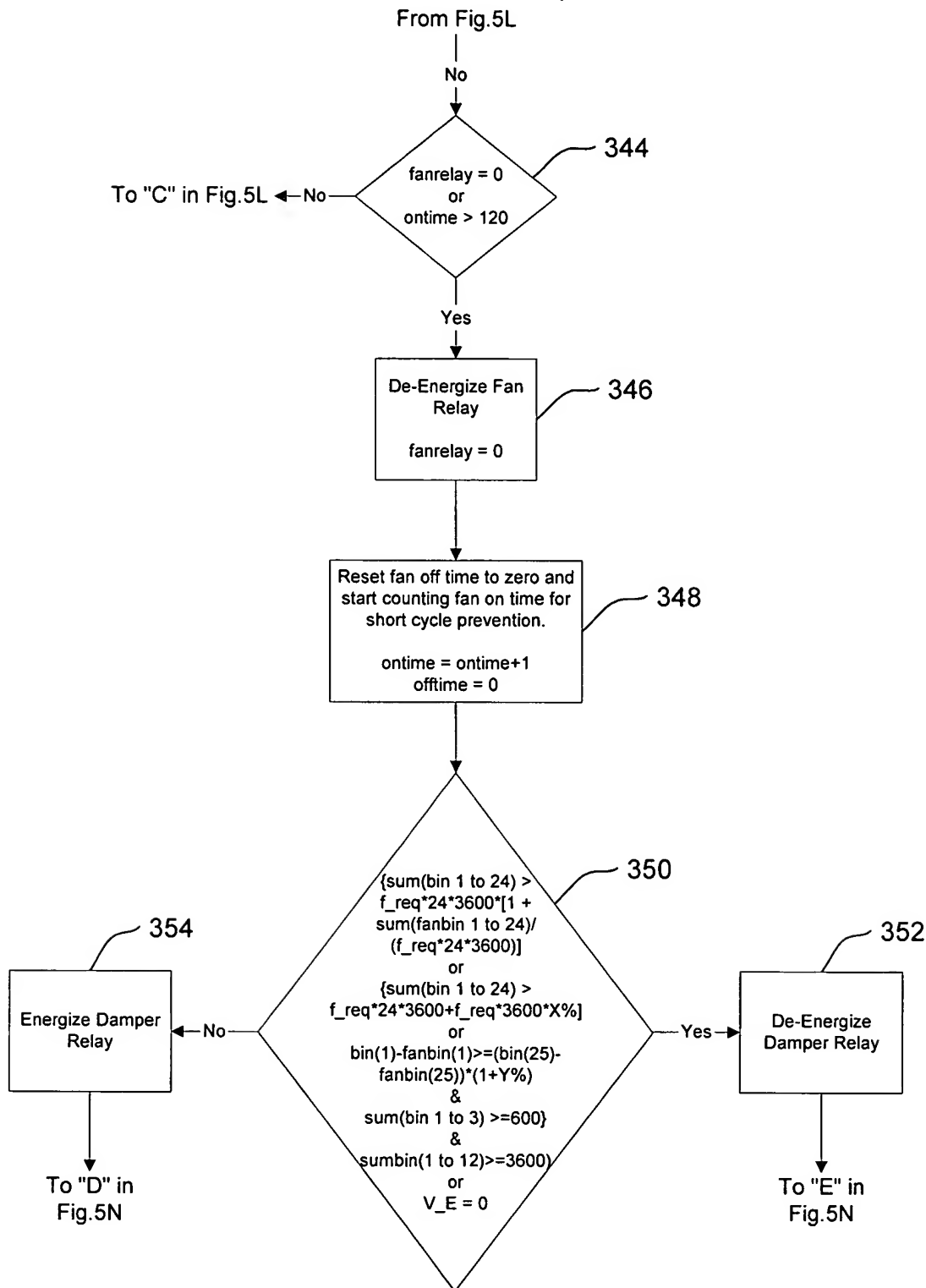


FIG. 5M

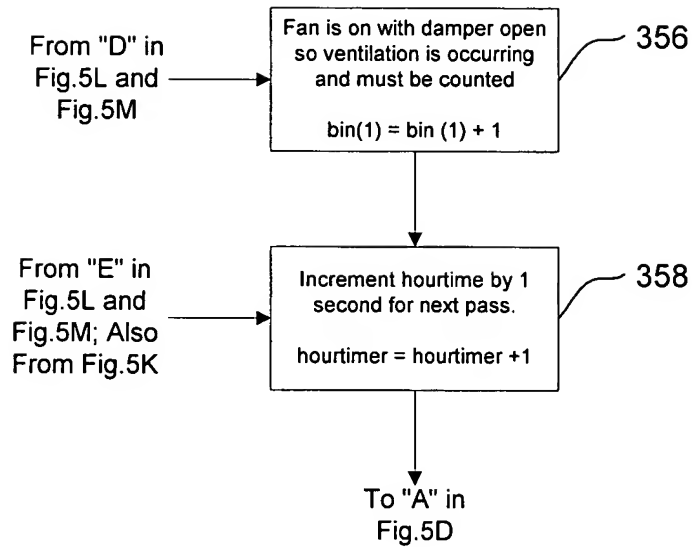


FIG. 5N

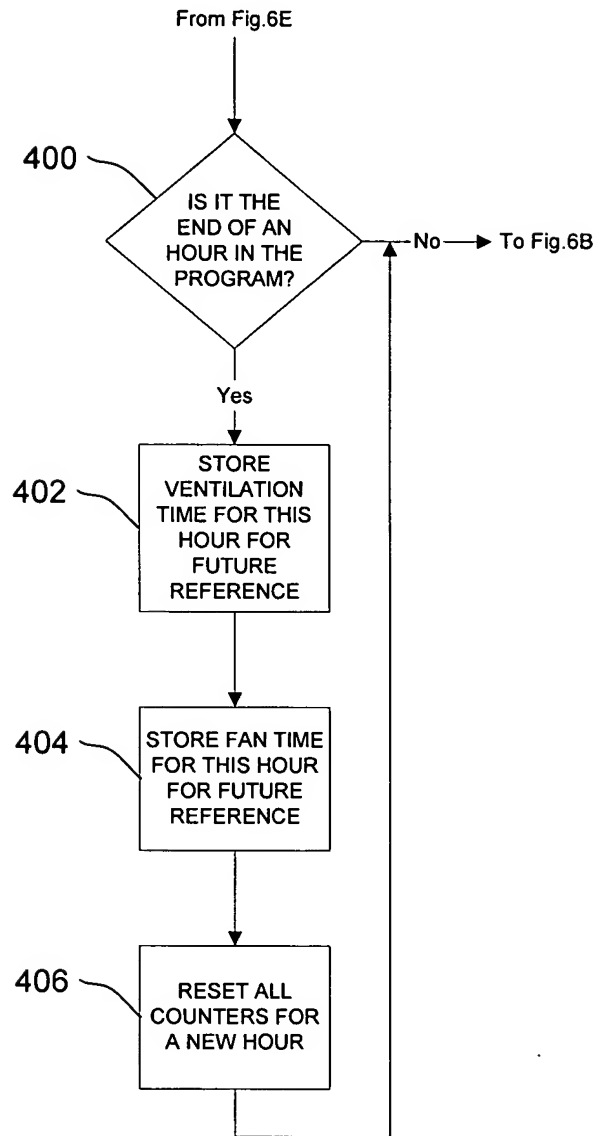


FIG. 6A

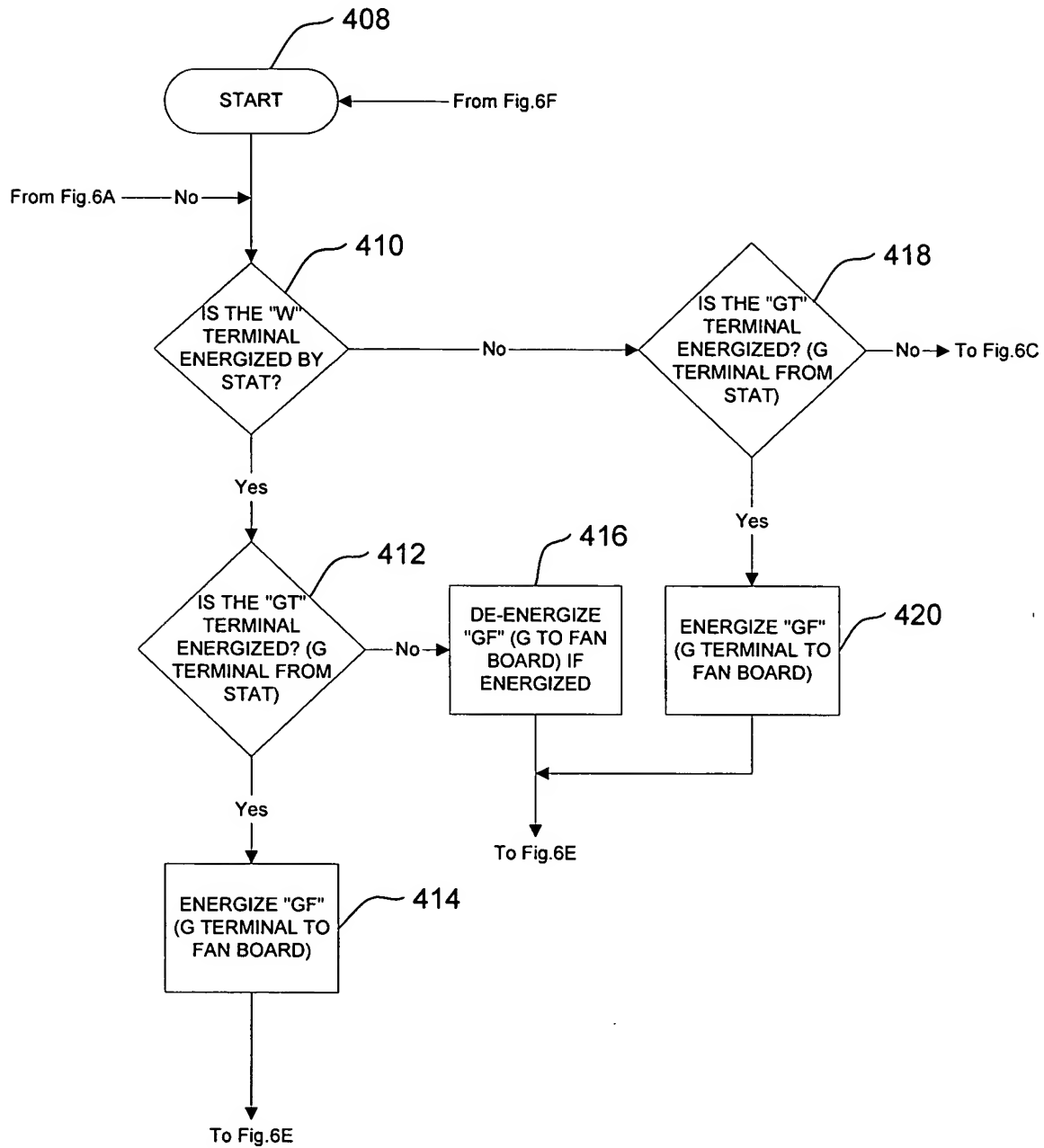


FIG. 6B

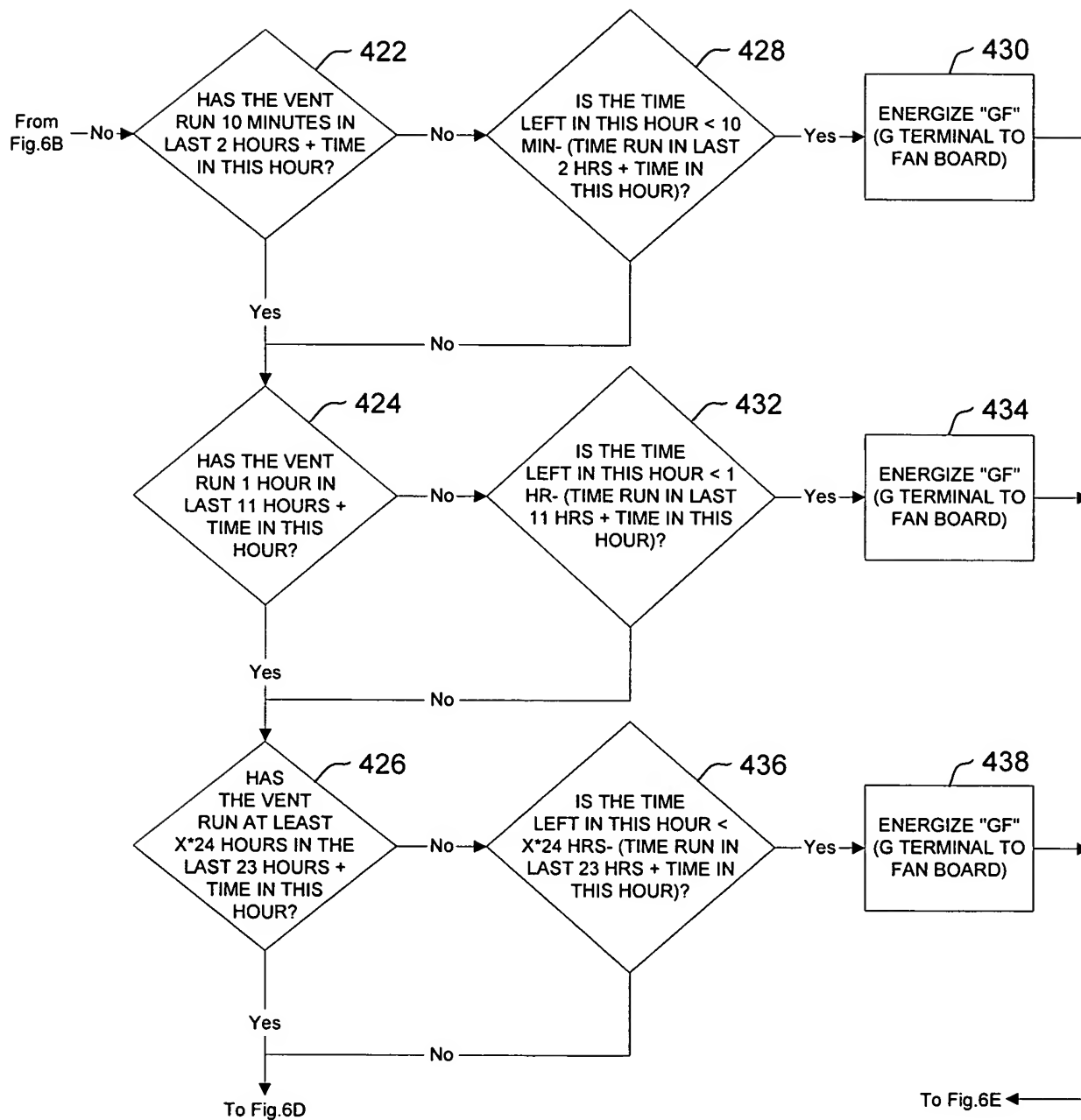


FIG. 6C

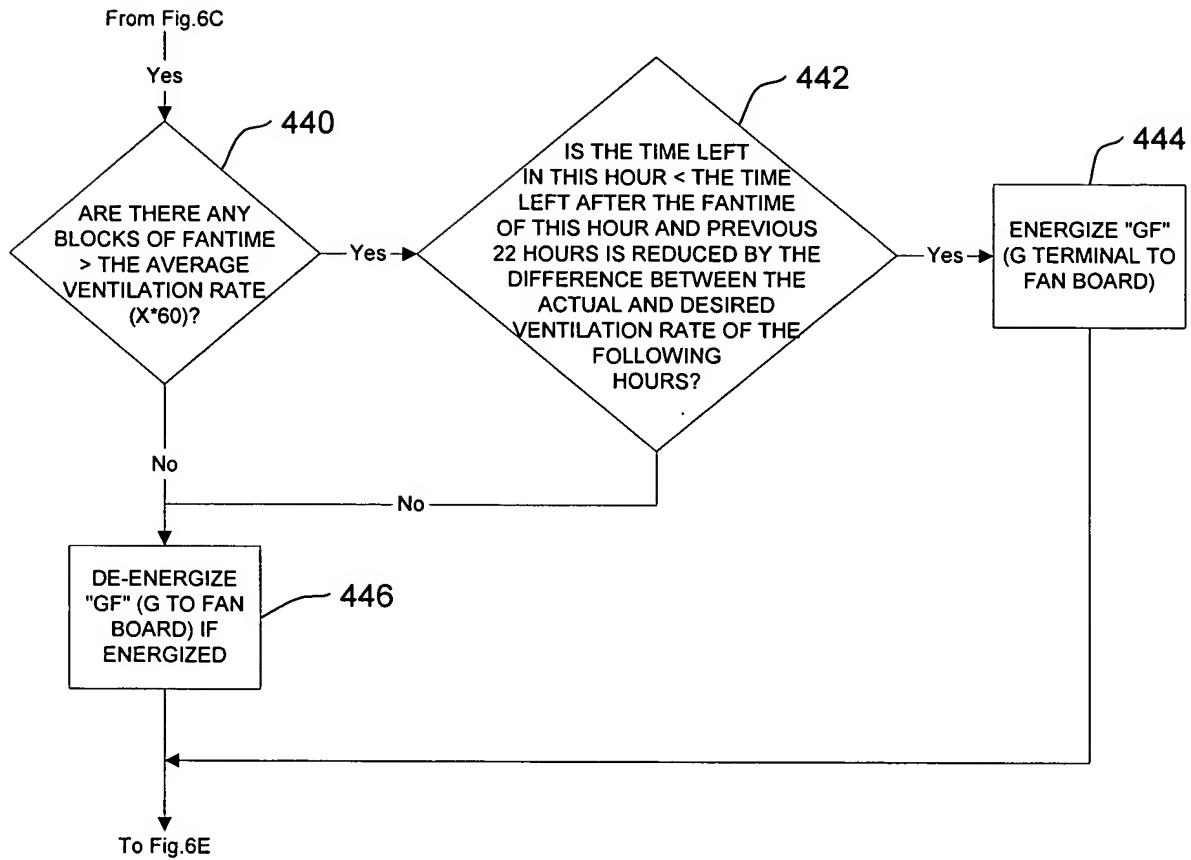


FIG. 6D

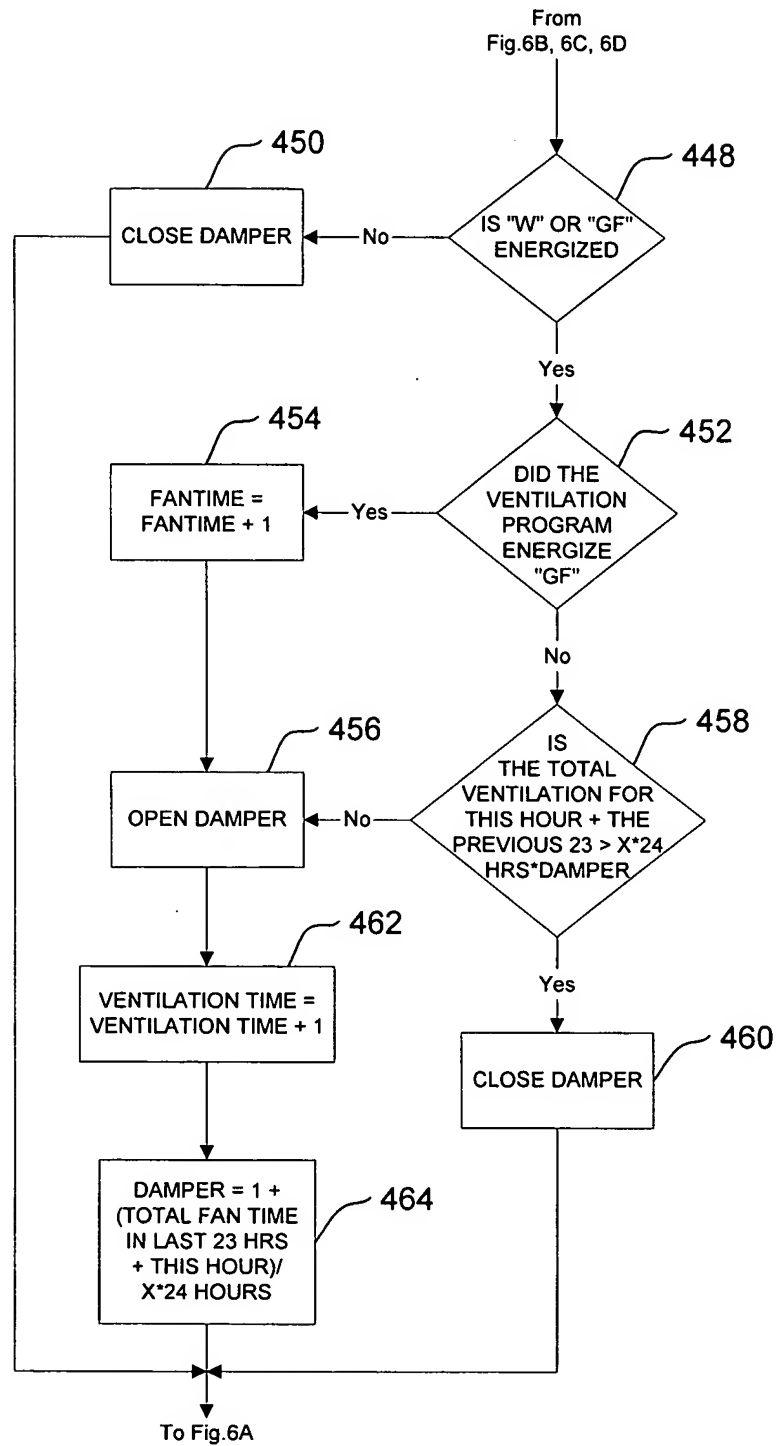


FIG. 6E

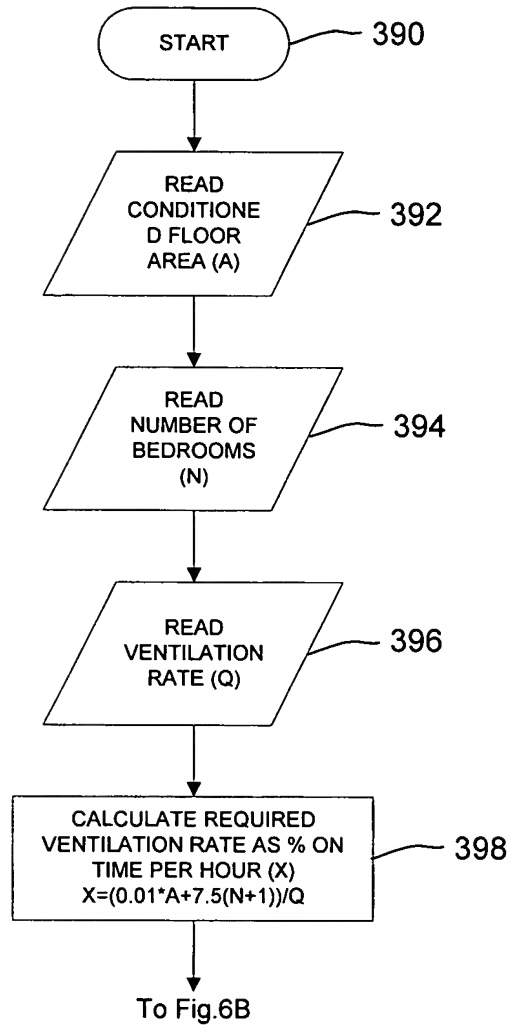


FIG. 6F

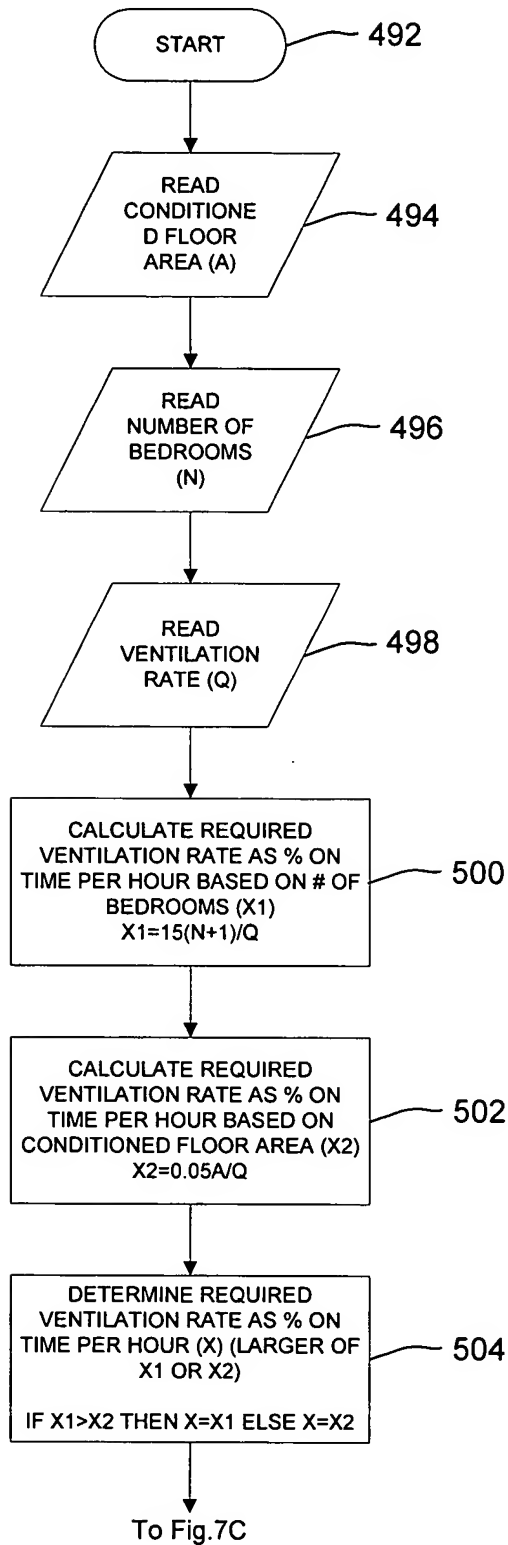


FIG. 7A

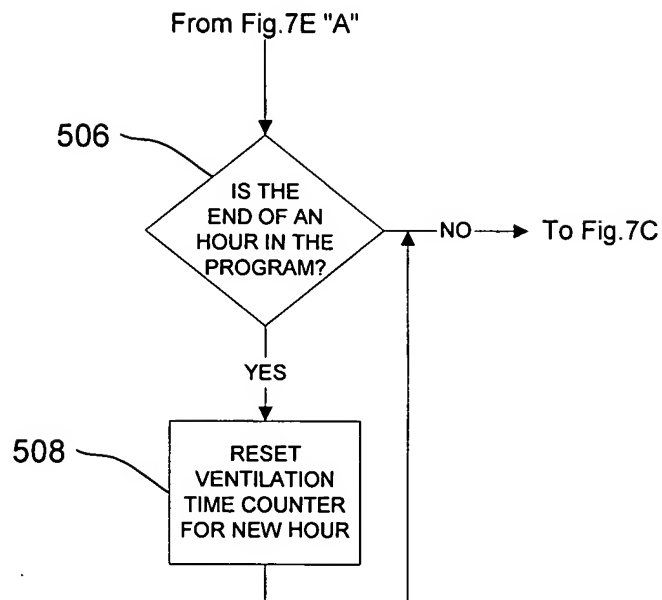


FIG. 7B

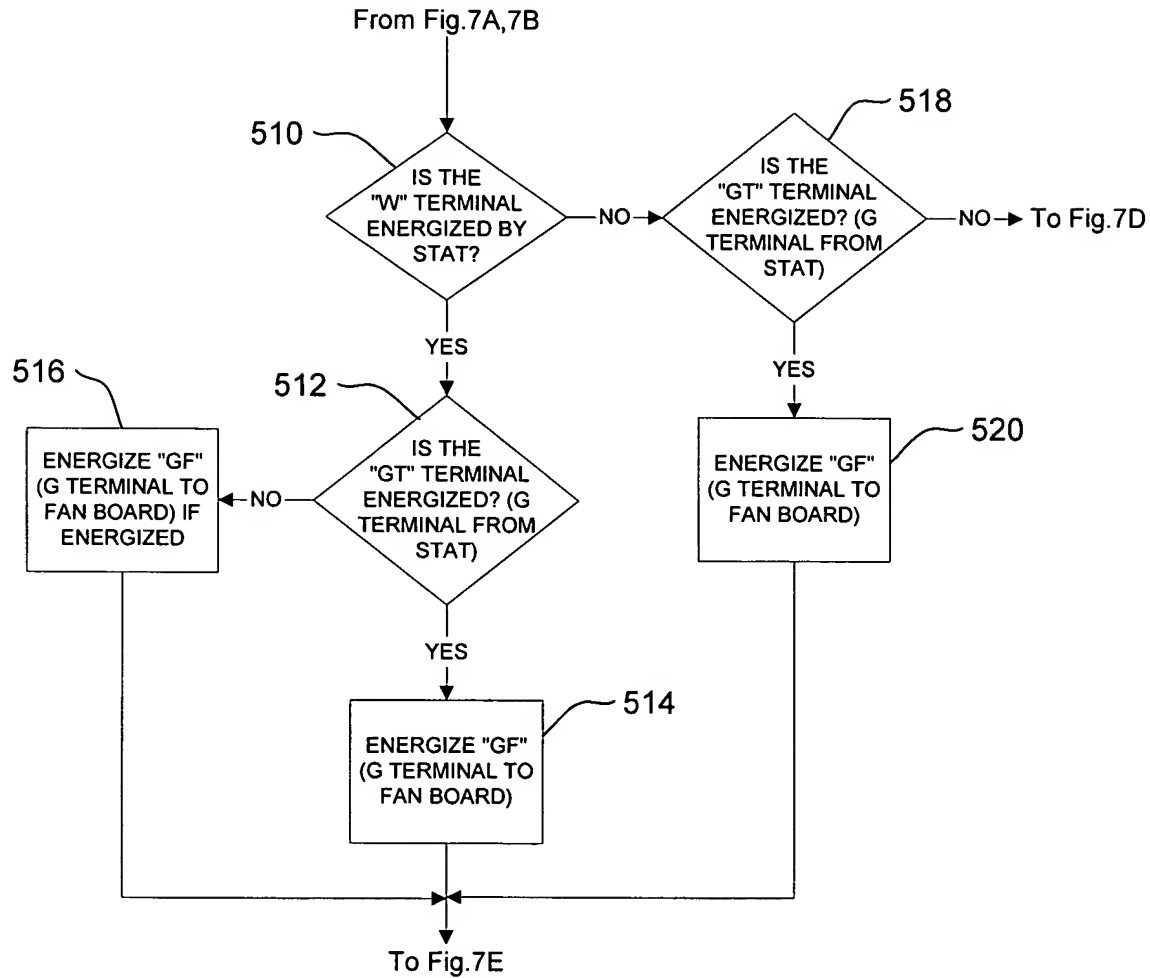


FIG. 7C

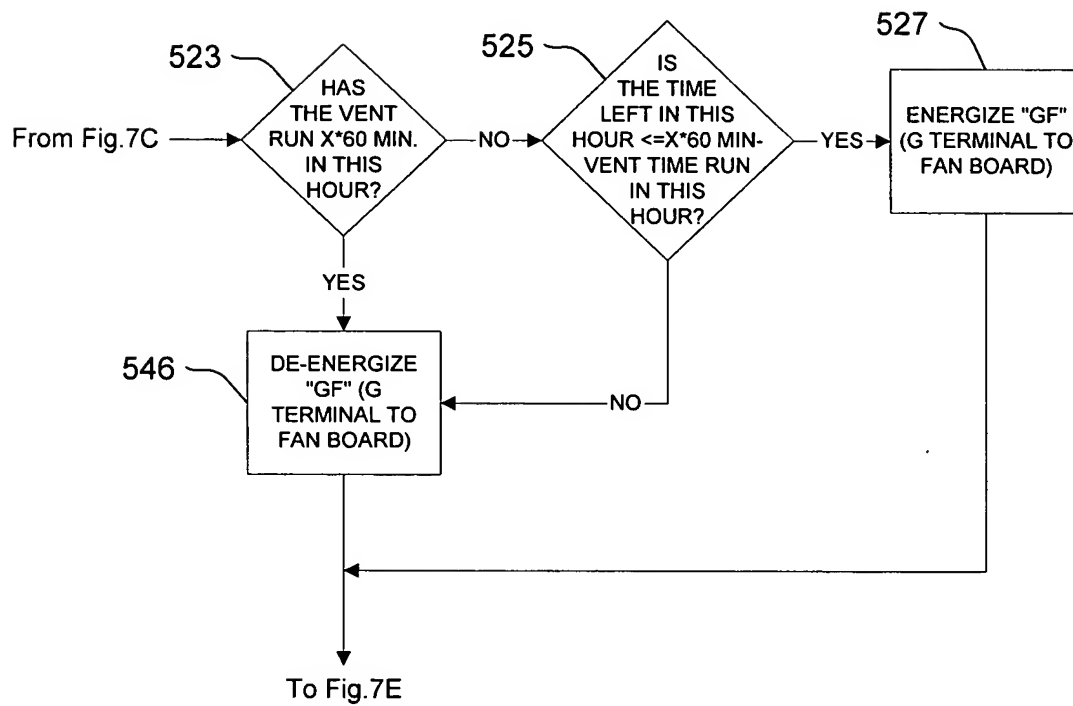


FIG. 7D

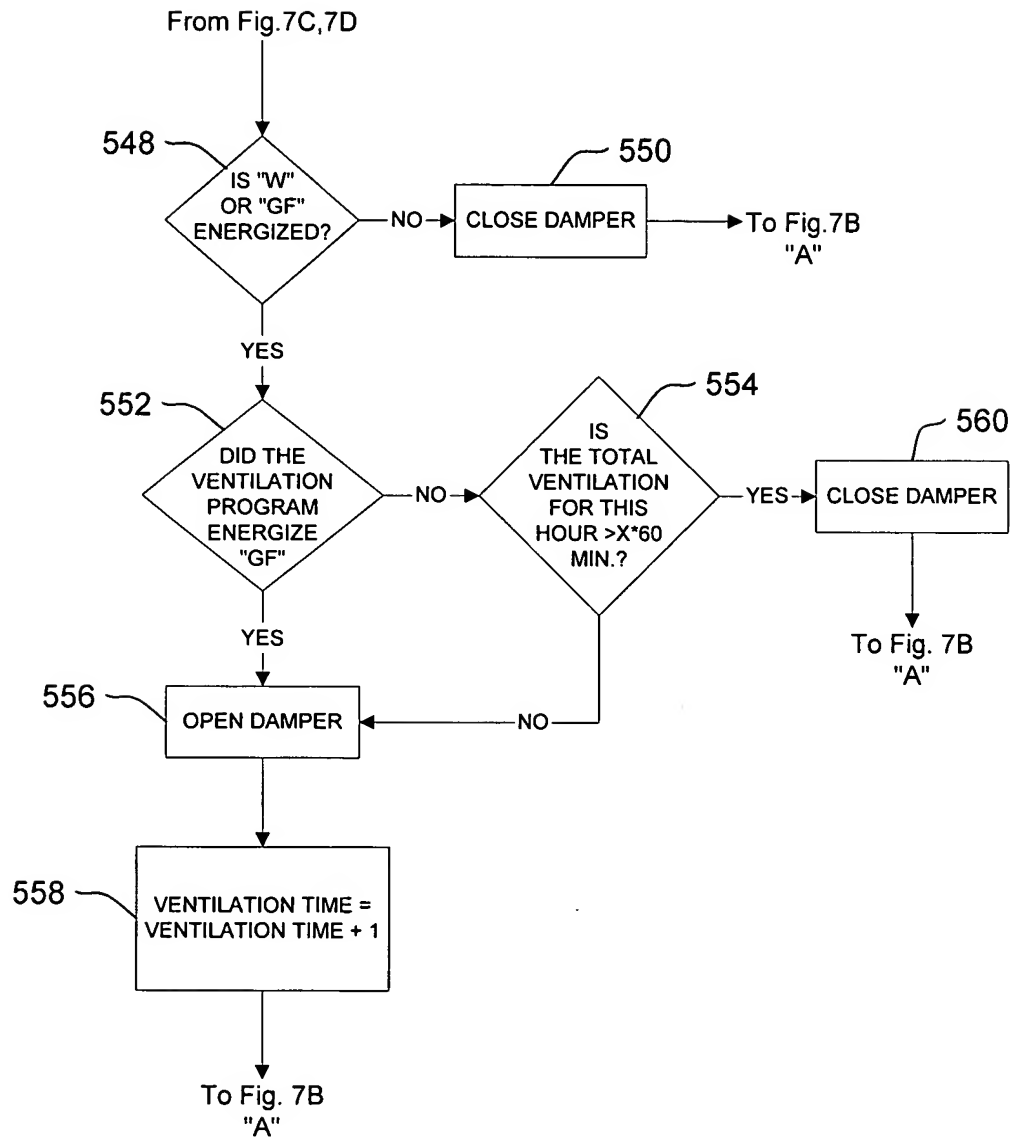


FIG. 7E

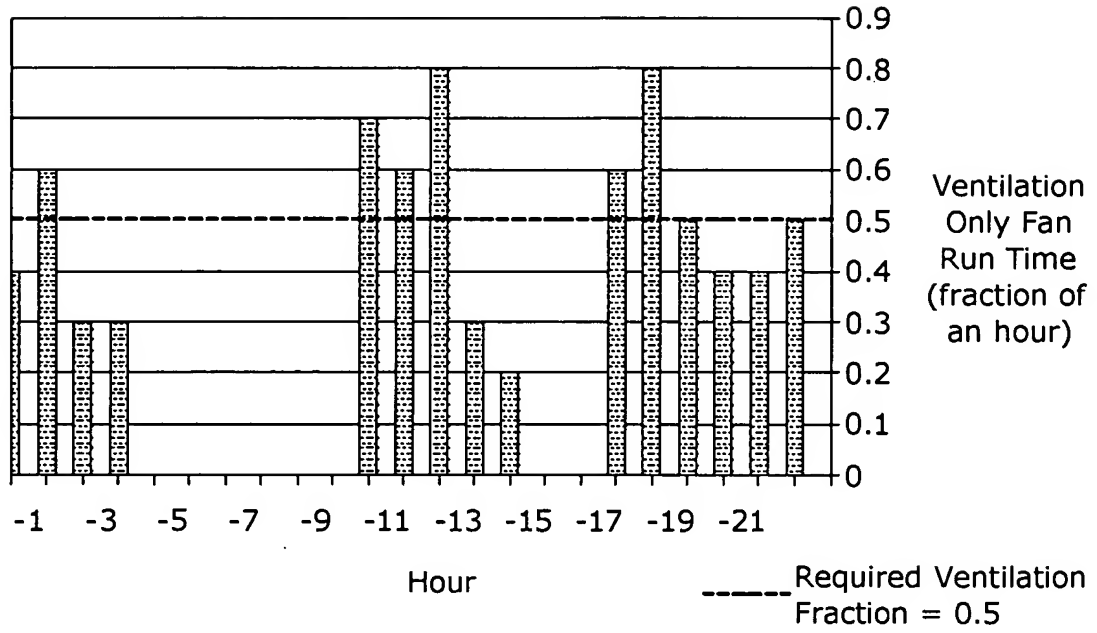


FIG. 8A

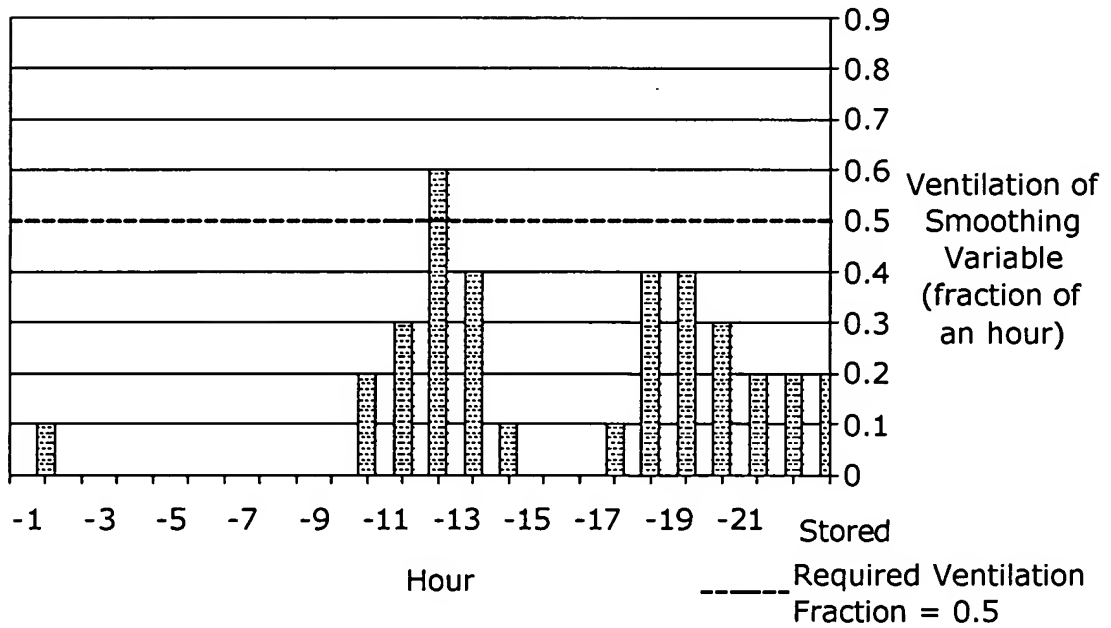


FIG. 8B



FIG. 9B

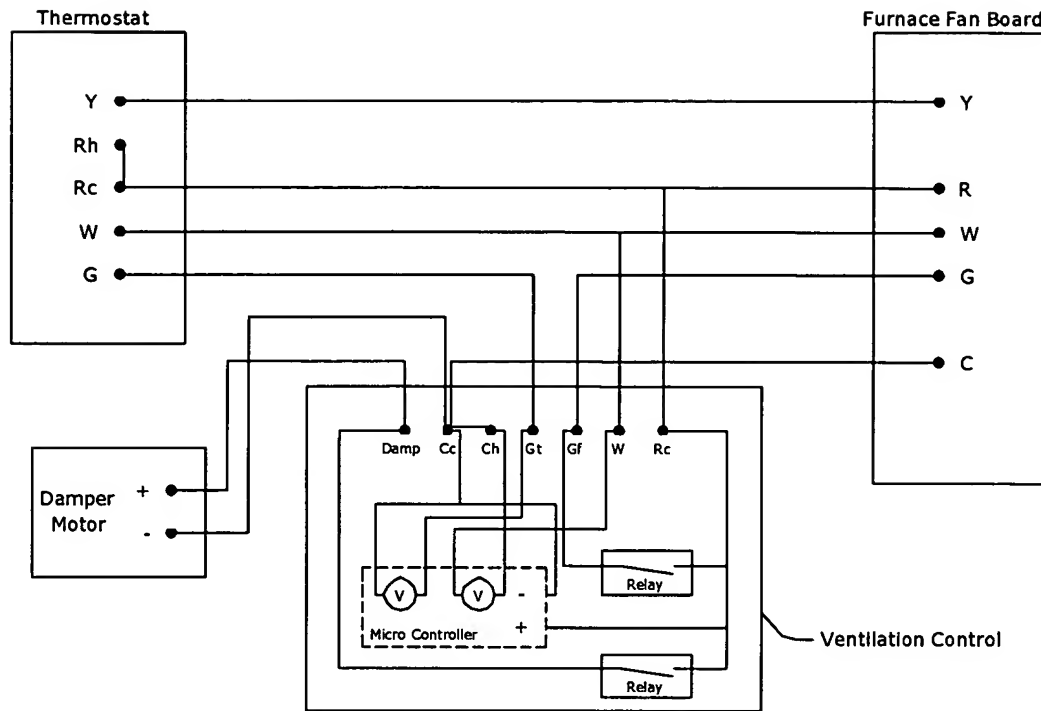


FIG. 9C

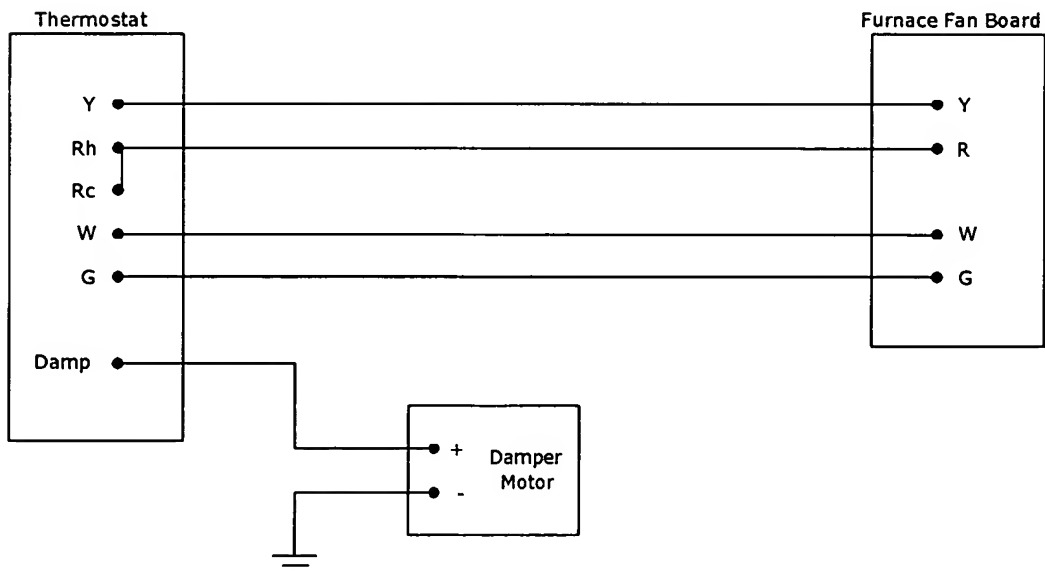


FIG. 9D

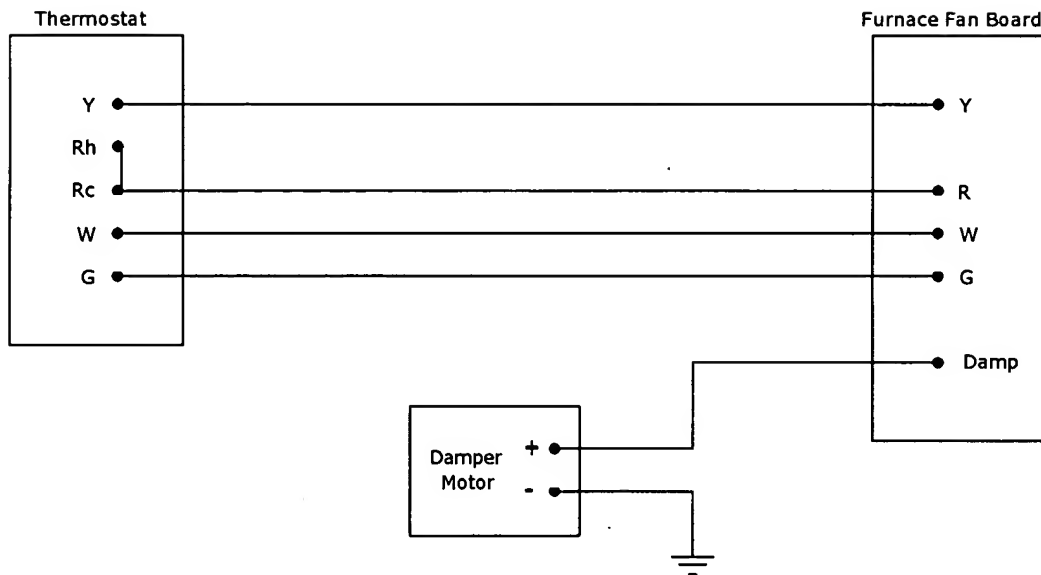


FIG. 9E

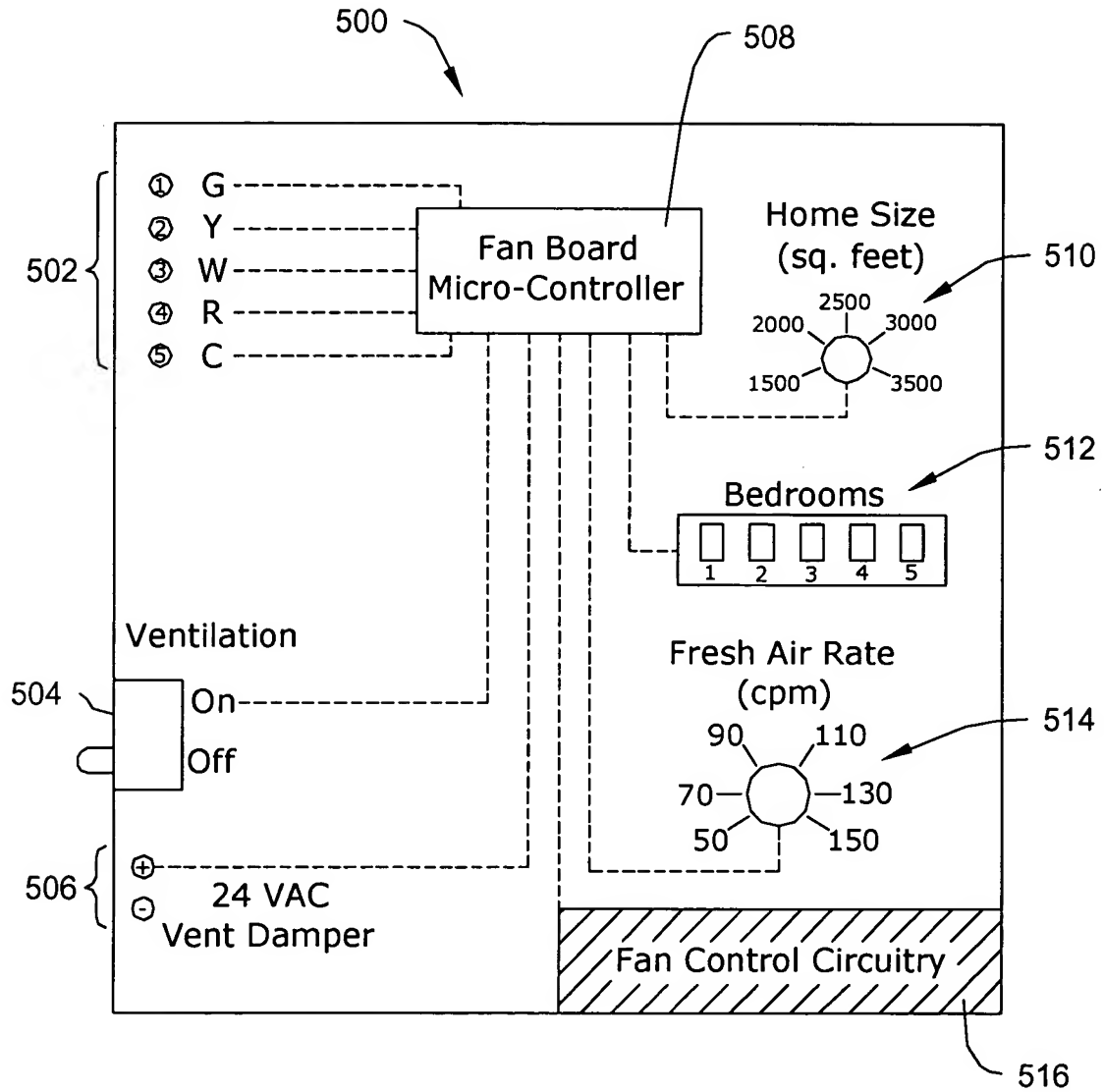


FIG. 10

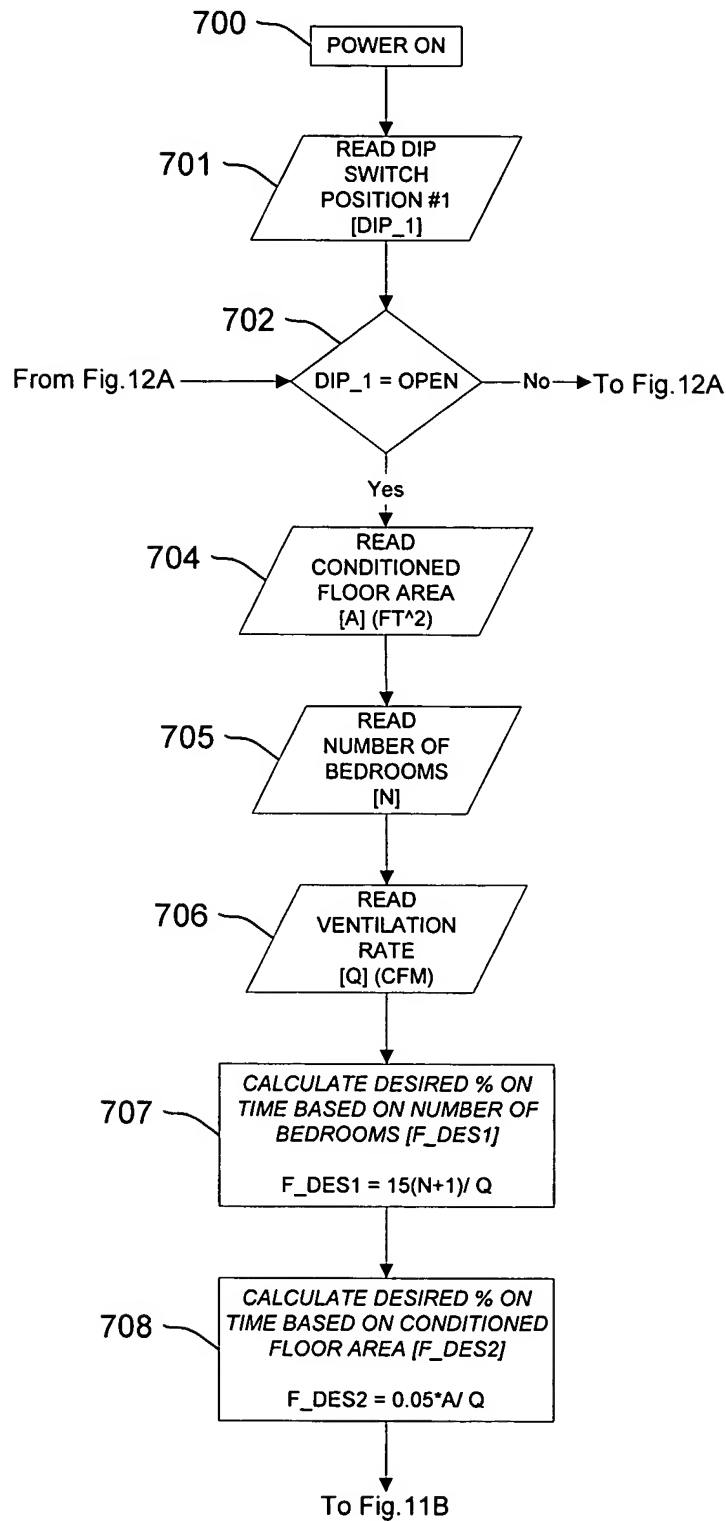


FIG. 11A

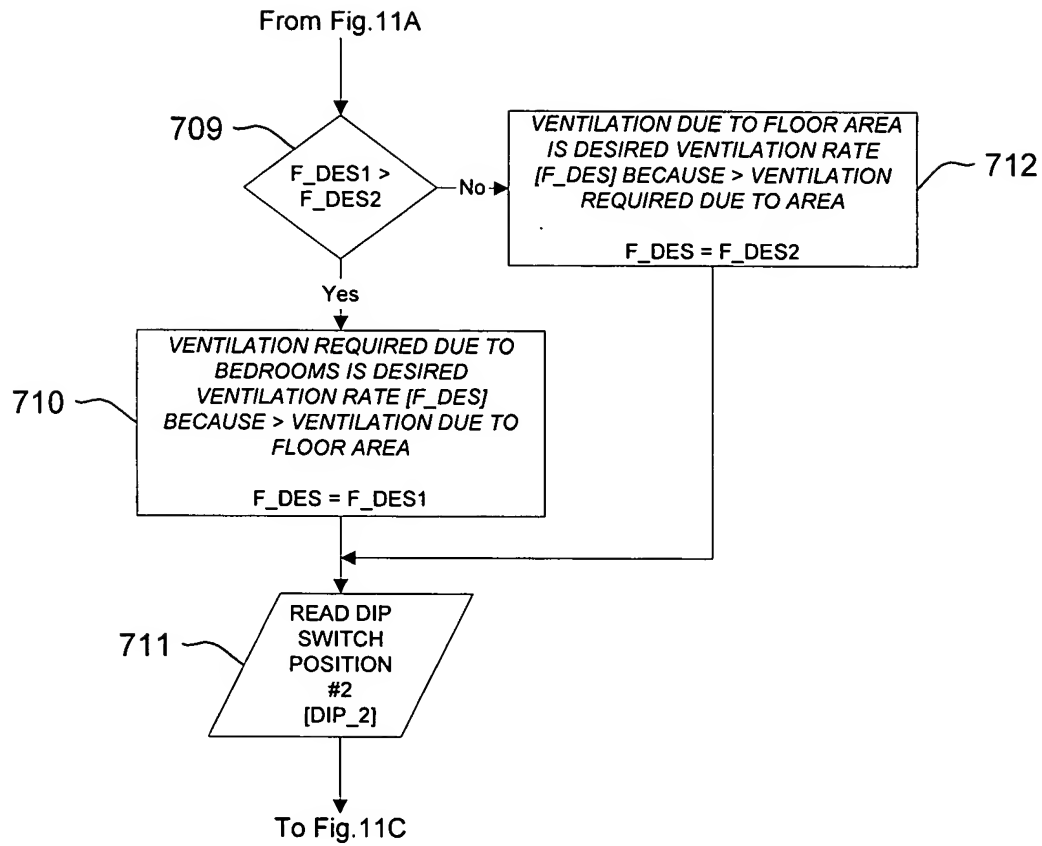


FIG. 11B

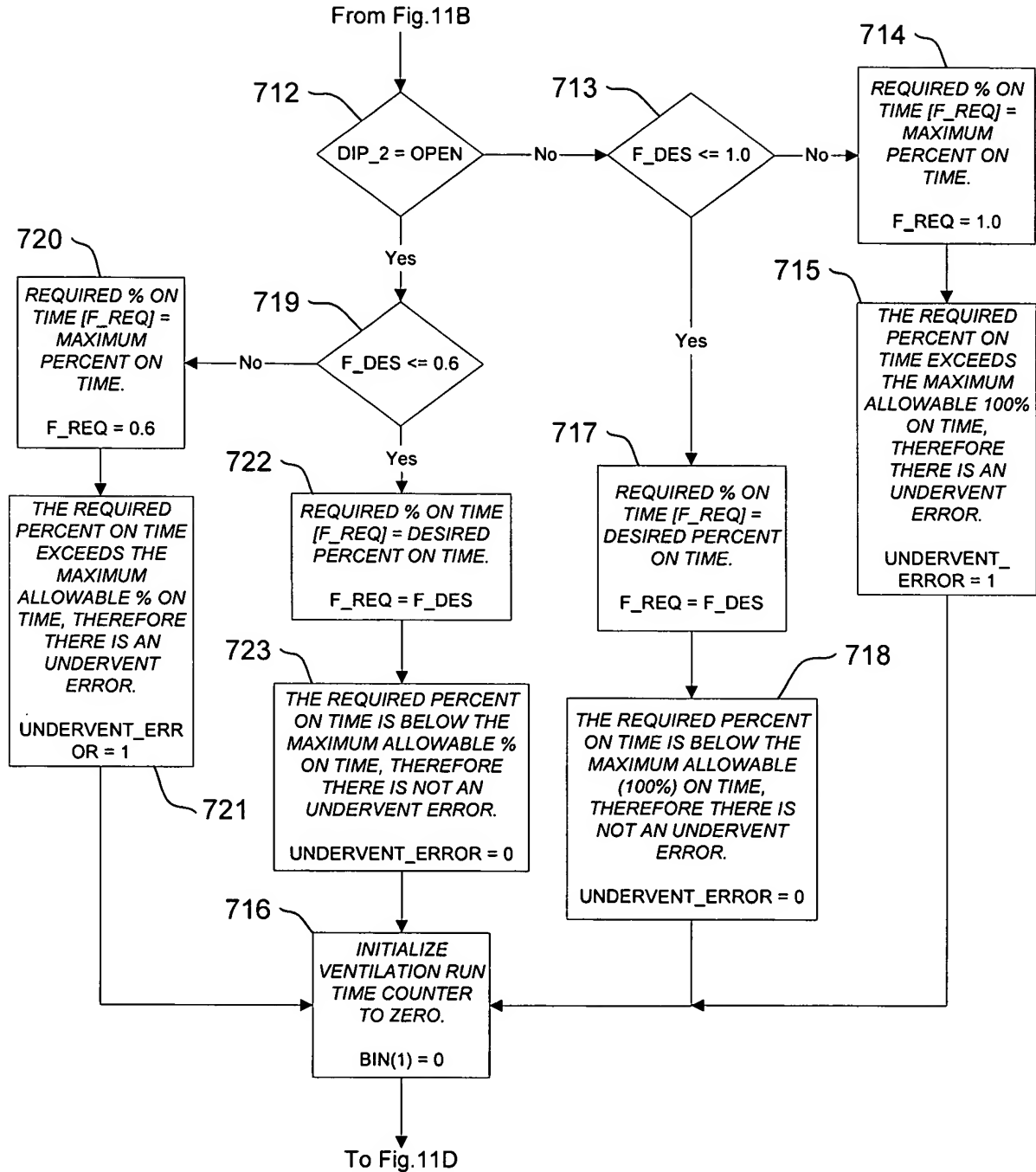


FIG. 11C

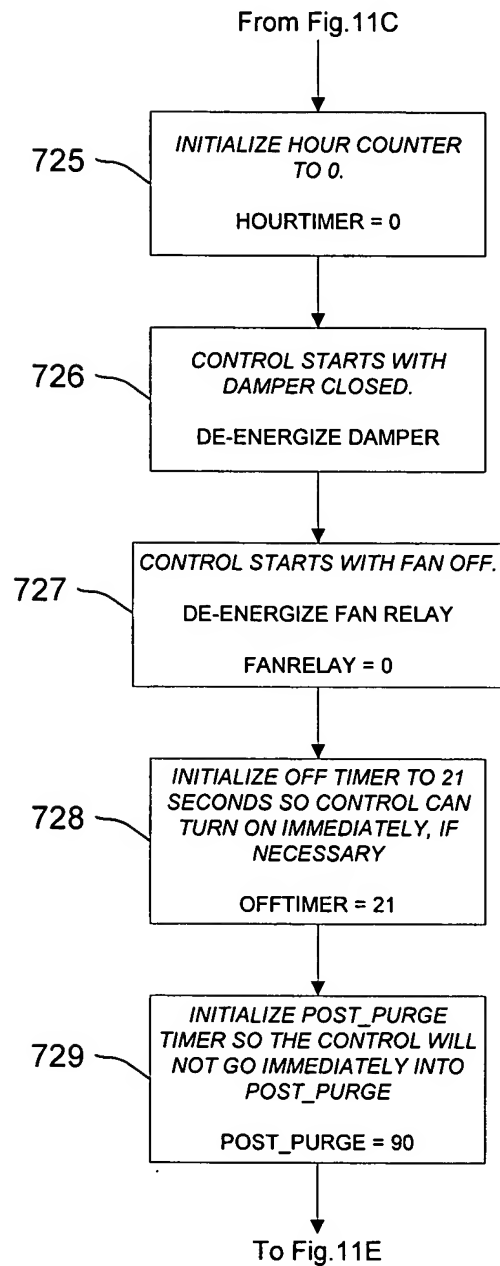


FIG. 11D

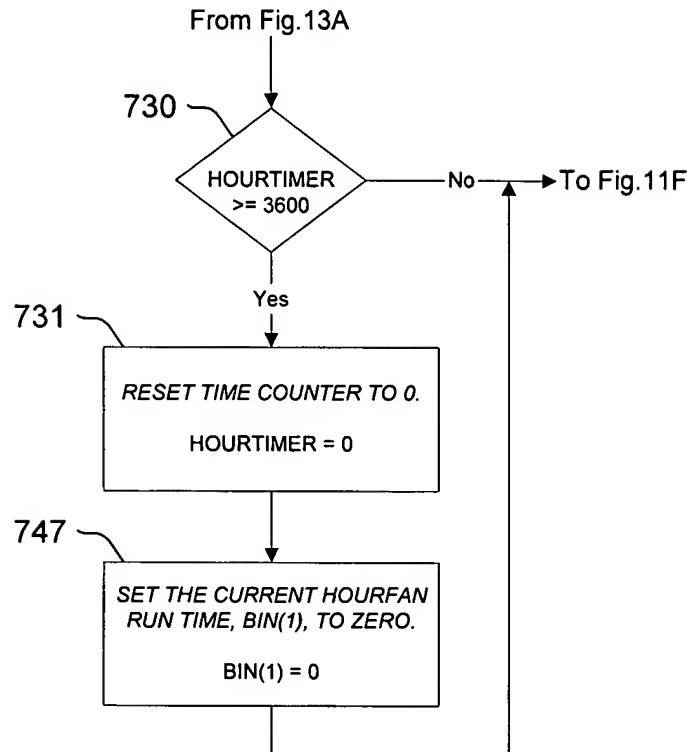


FIG. 11E

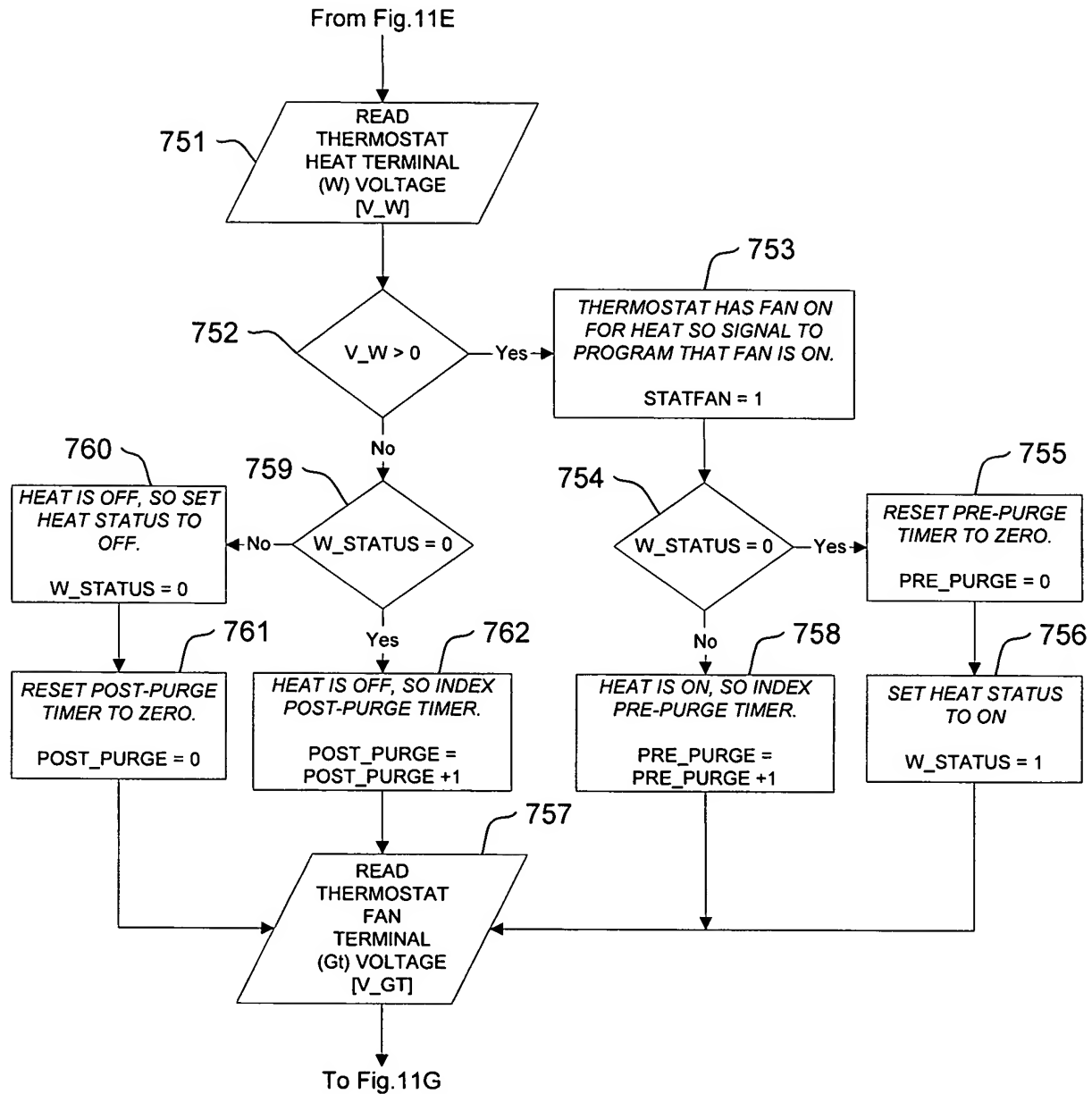


FIG. 11F

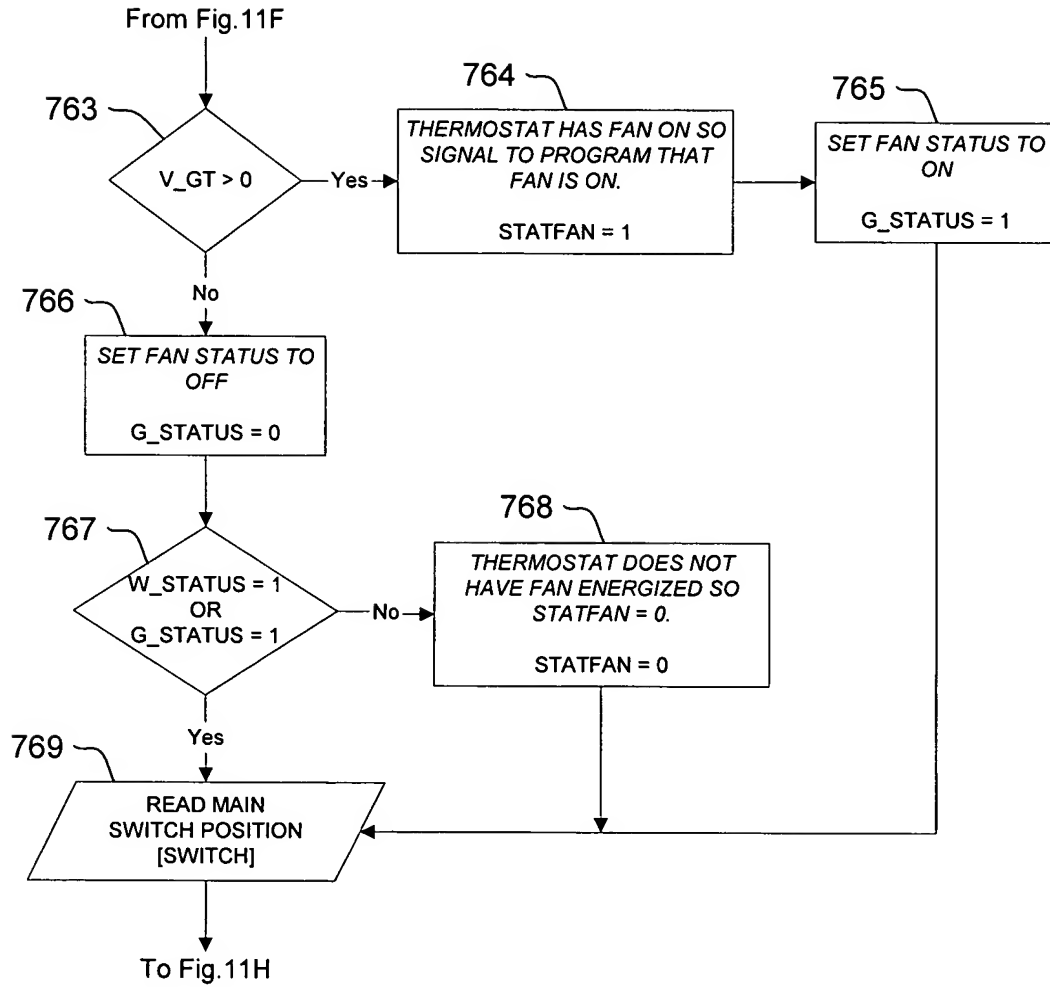


FIG. 11G

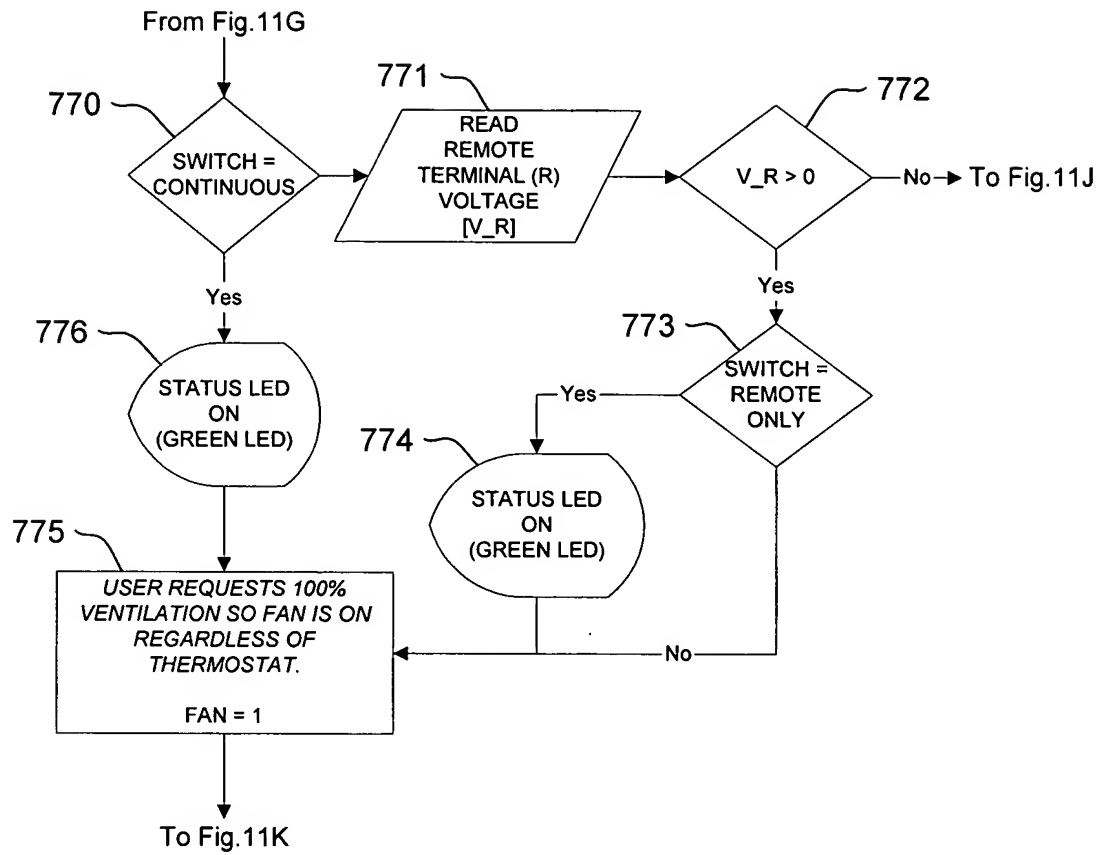


FIG. 11H

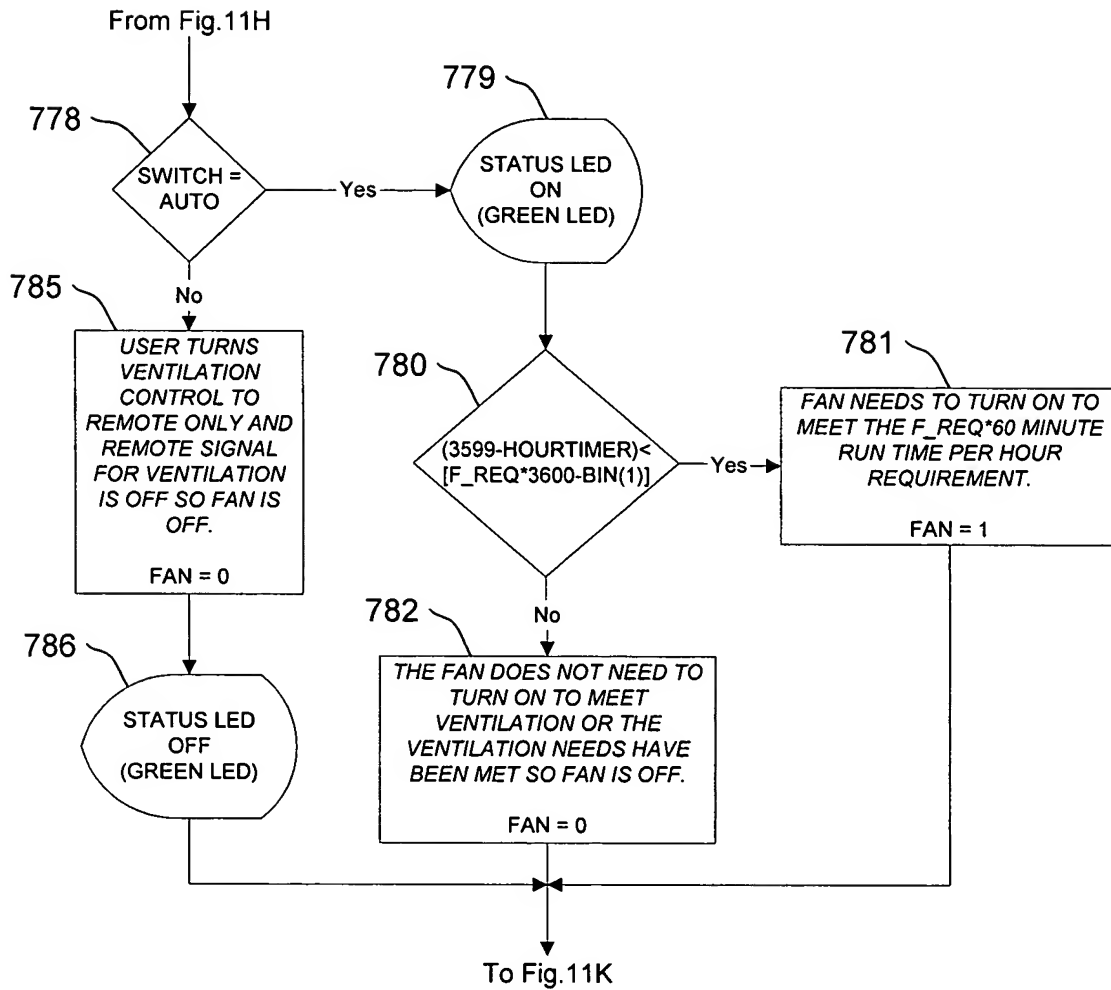


FIG. 11J

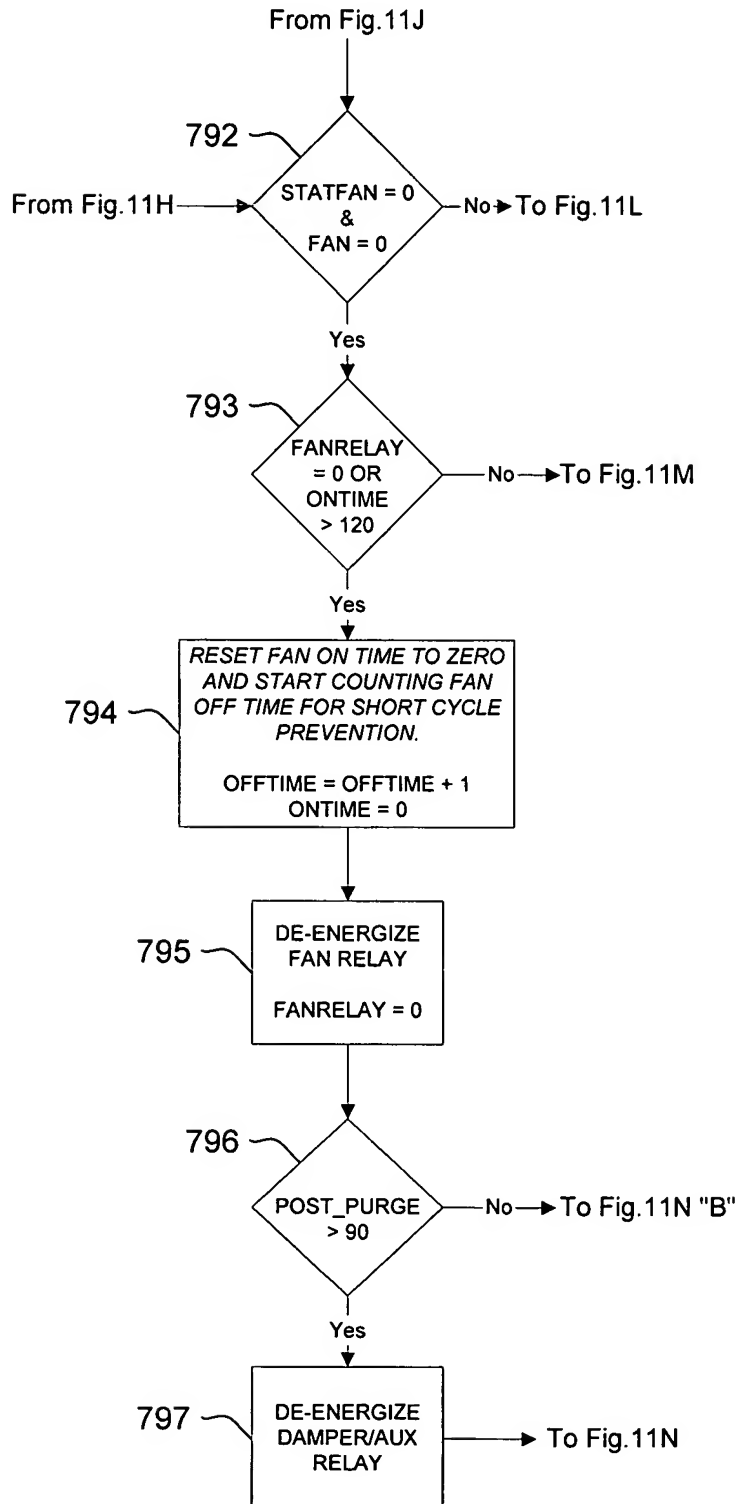


FIG. 11K

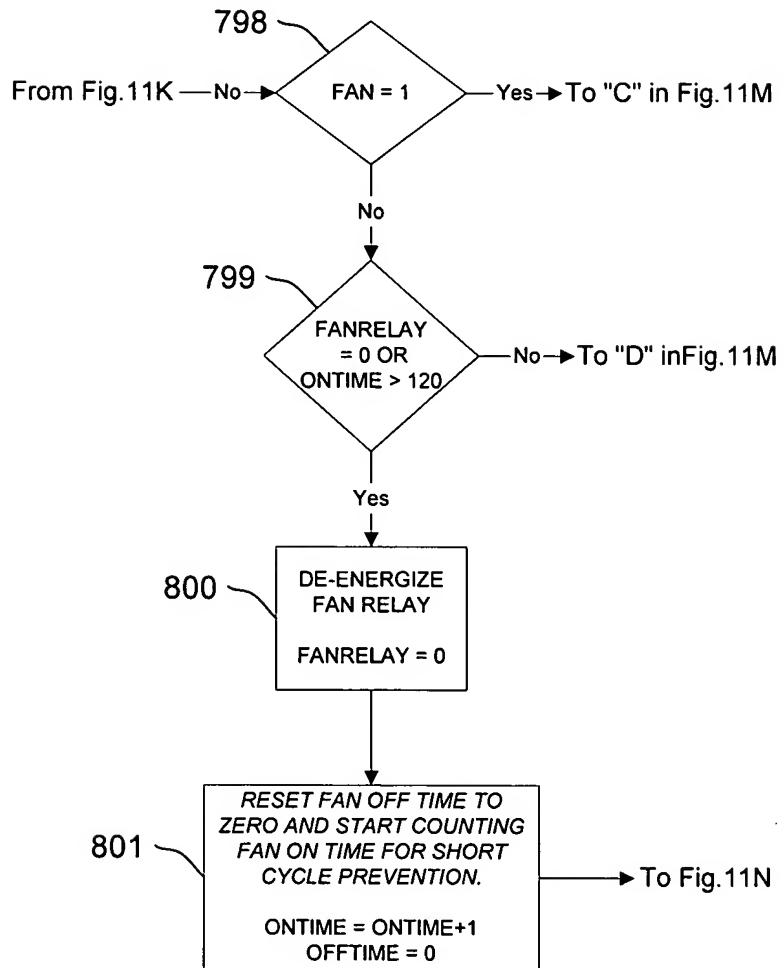


FIG. 11L

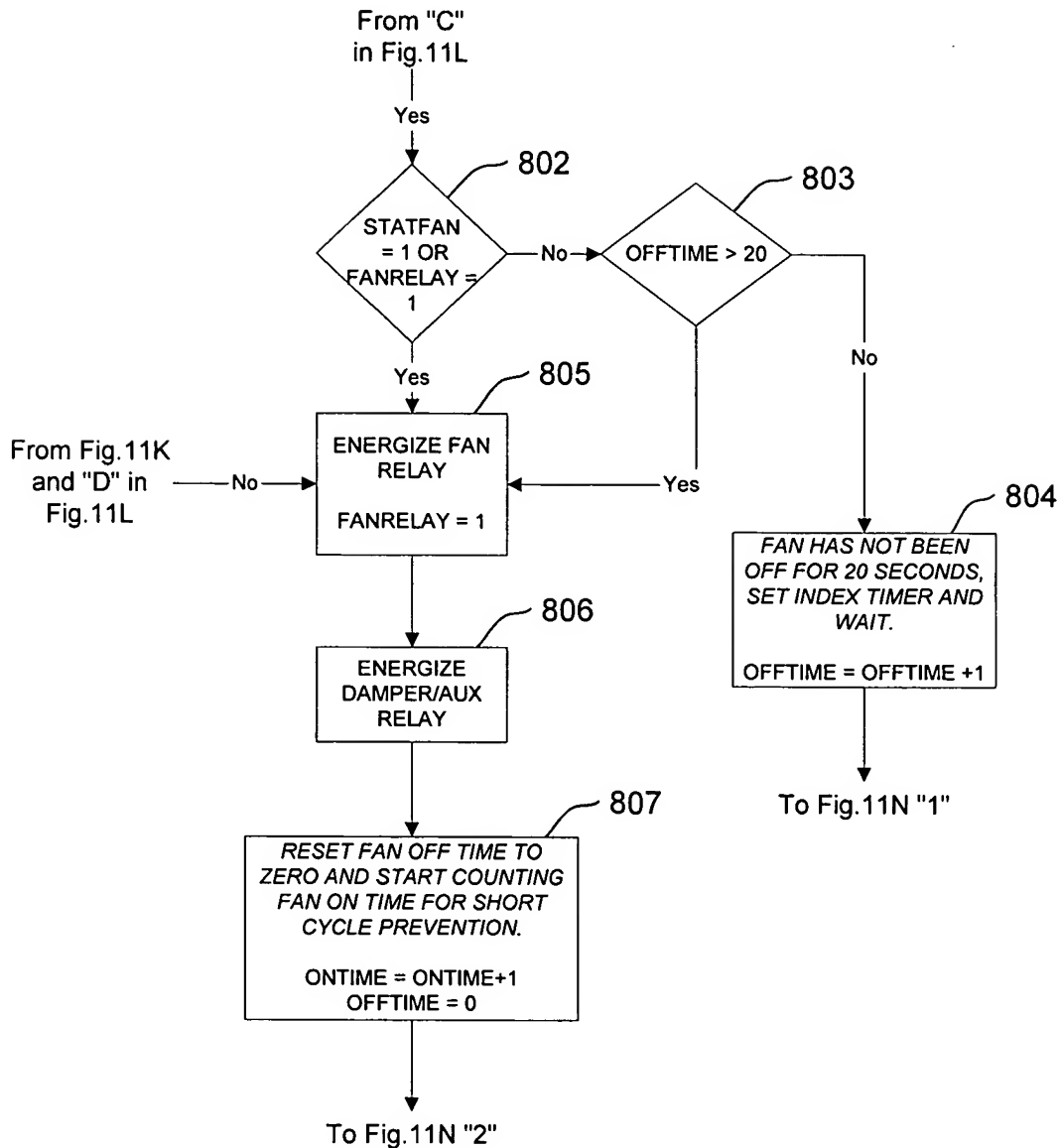


FIG. 11M

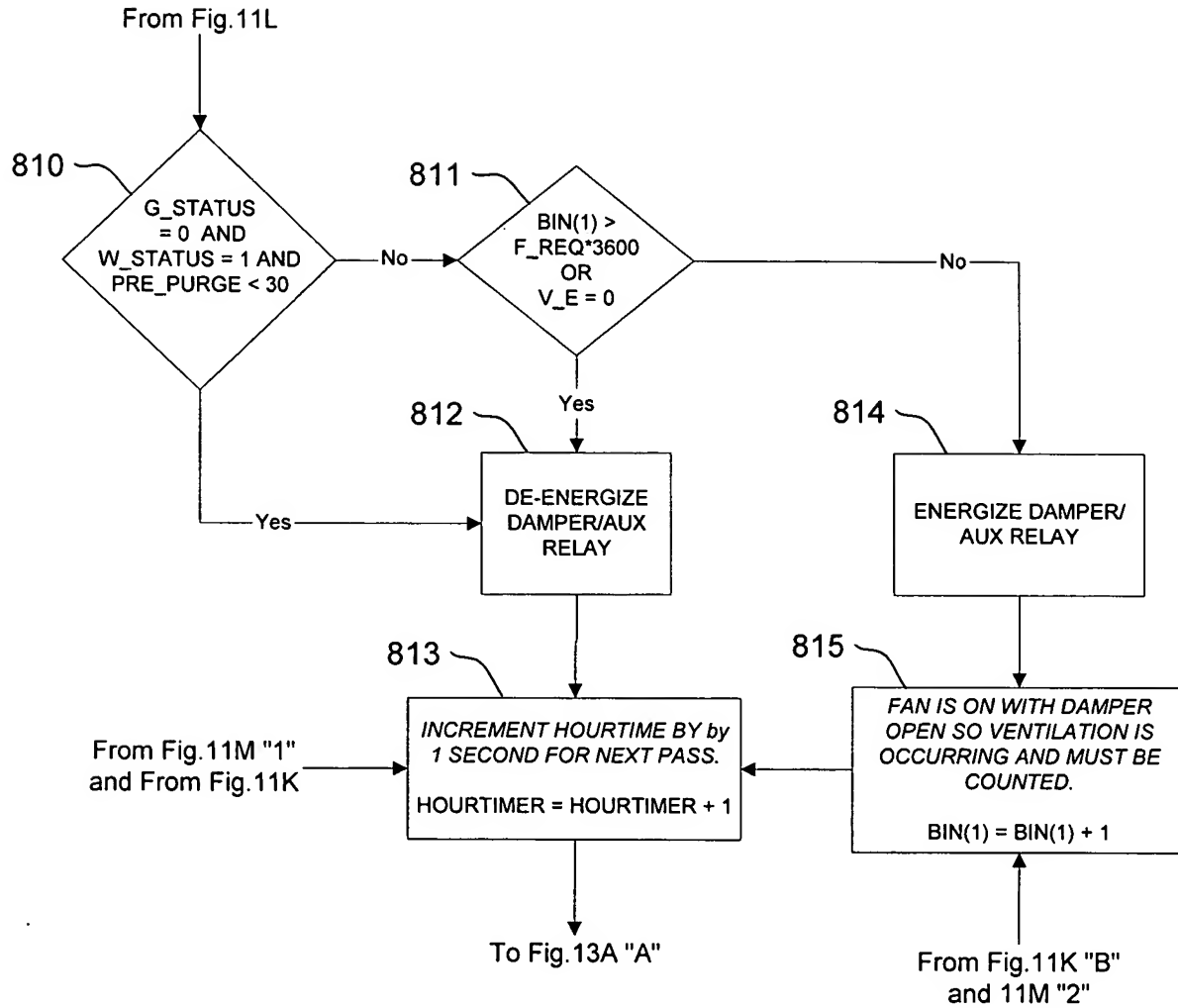


FIG. 11N

VARIABLE KEY

A - user input, conditioned floor area (ft. sq)
N - user input, number of bedrooms
Q - user input, ventilation rate with fan on (CFM)
f_des - desired percent on time to meet ASHRAE 62.2P
f_req - required ventilation rate control will meet
bin(i) - set of 24 bins to keep track of ventilation run time per hour
fanbin(i) - set of 24 bins to track ventilation run time when thermostat is not on
hourtimer - variable to keep track of time in program
smooth - time in hour control must run to prevent long fan cycles
V_Gt - voltage on thermostat fan terminal
V_w - voltage on thermostat heat terminal
statfan - indicates thermostat has the fan on or off (0=fan off)
V_R - remote terminal voltage, indicates homeowner remote ventilation call
fan - indicates control algorithm wants fan off or on for ventilation (0 = off)
fanrelay - indicates that the ventilation control relay is energized, control actually has fan on/off (0=off)
offtime - variable keeps track of time fan has been off
ontime - variable keeps track of time fan has been on
remote - this is a timer to keep track of amount of time per hour remote control is on
thermo - this is the ventilation time due to the thermostat, necessary to correct fanbin run time
undervent_error - indicates that the control will underventilate (0= will not underventilate, 1 = will underventilate)
DIP_1 - user input, ventiaition method (OPEN = ASHRAE 62.2, CLOSED = MN MEC (ASHRAE 62-2001))
DIP_2 - user input, maximum percent on time (OPEN = 60% limit, CLOSED = No Limit [100%]) entered using DIP switch
TEST - user input, momentary test mode button (1 = button pushed, 0 = button not pushed)
Test_mode - indicates whether unit is in test mode (1= in test mode)
test_timer - timer to track amount of time unit is in test mode, used to exit test mode after 180 sec. automatically
W_status - indicates that there is a W call from the thermostat (0 = no W call, 1 = W call)
pre_purge - timer used to make sure control accounts for 30 second pre-purge at start of heat call
post_purge - timer used to make sure system accounts for 90 second post- purge after heat call
G_status - indicates that there is a G call from the thermostat (0 = no G call, 1 = G call)
SWITCH - user input, position of main control switch (REMOTE ONLY, AUTO, or CONTINUOUS)

FIG. 11P

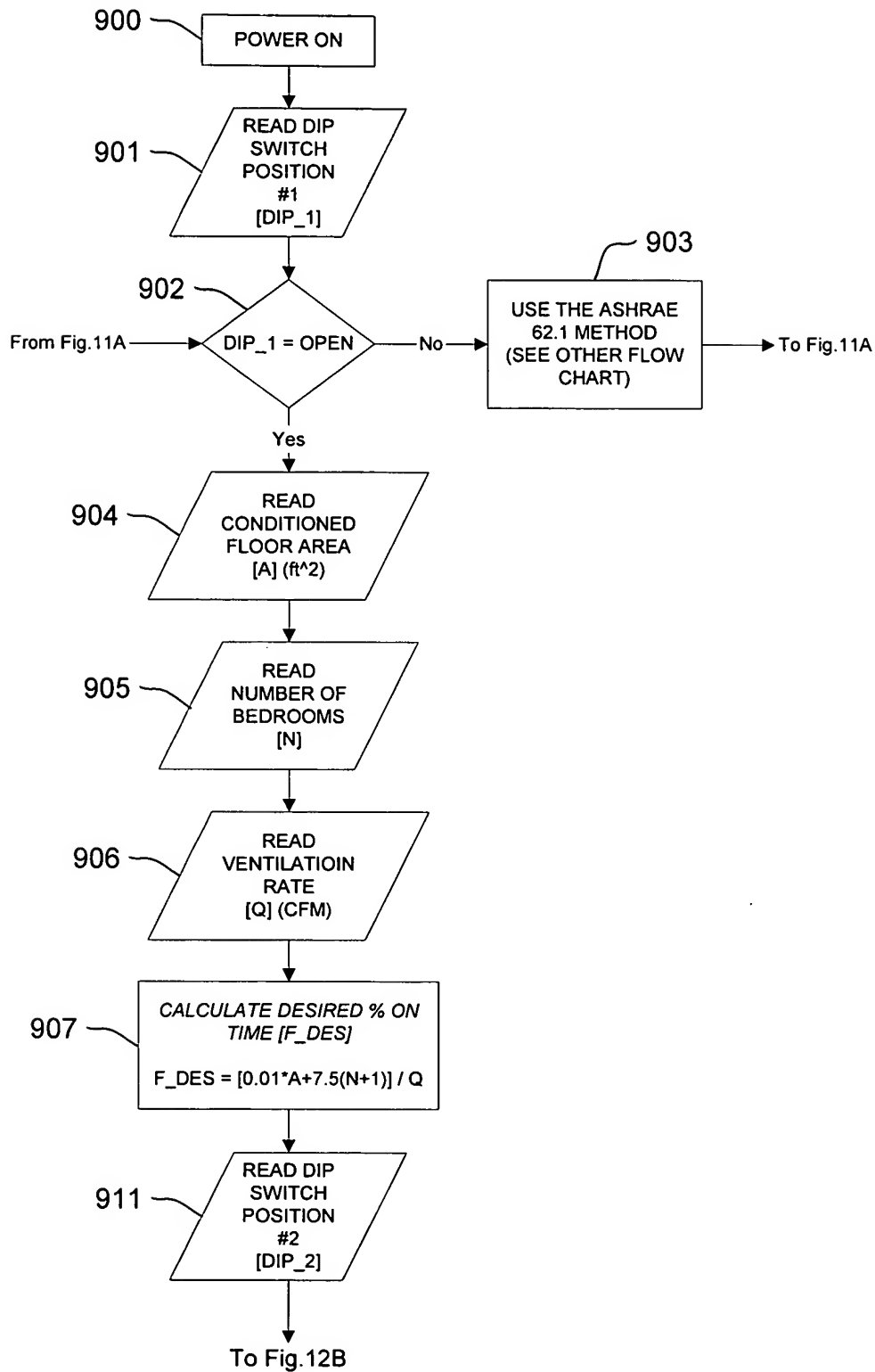


FIG. 12A

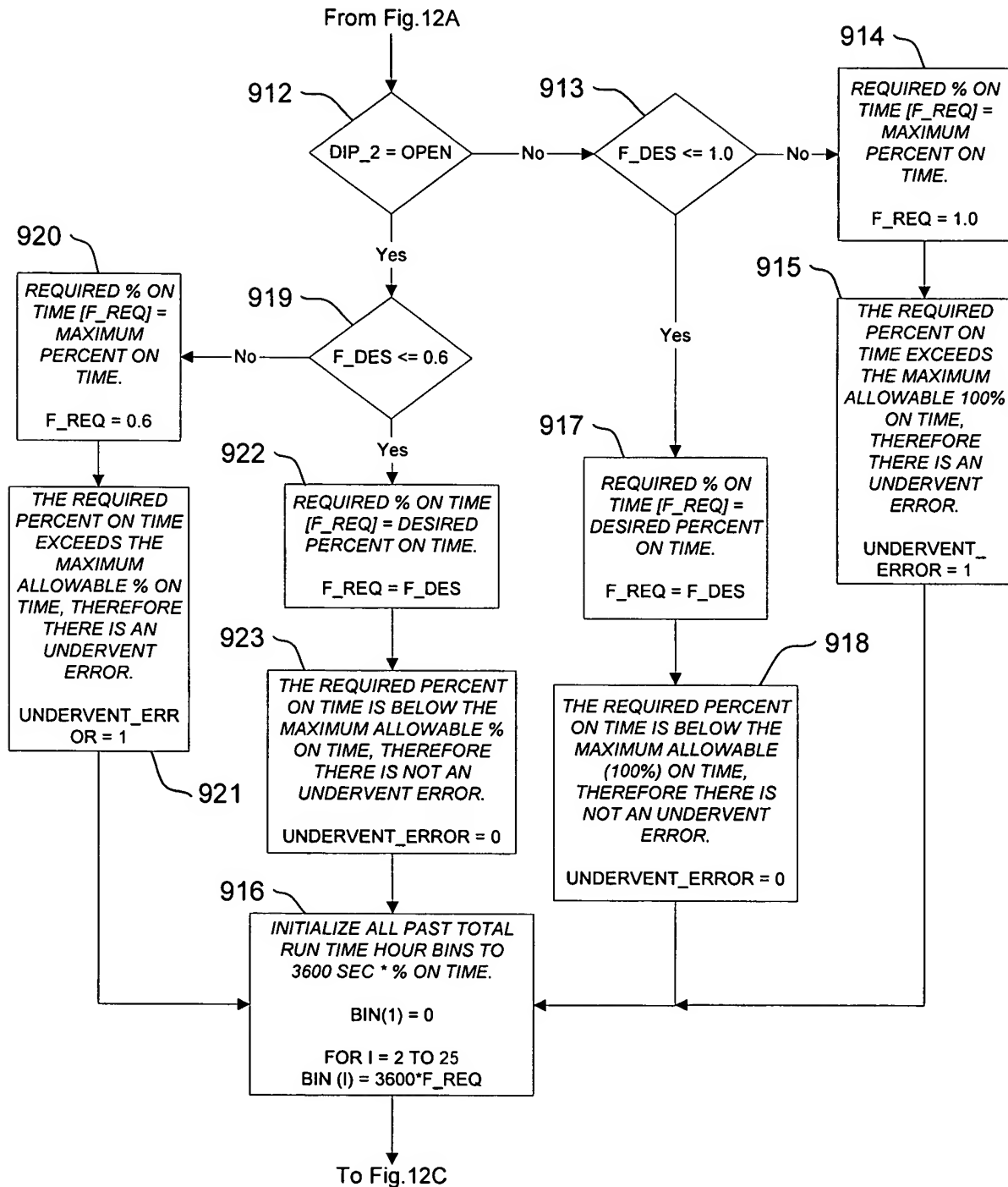


FIG. 12B

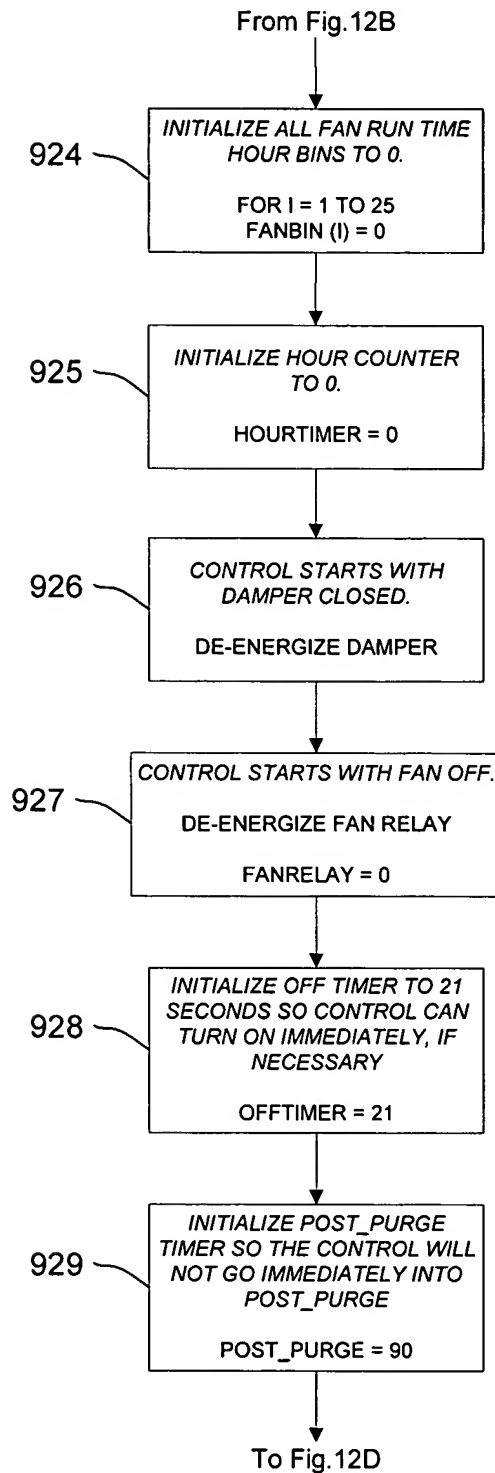


FIG. 12C

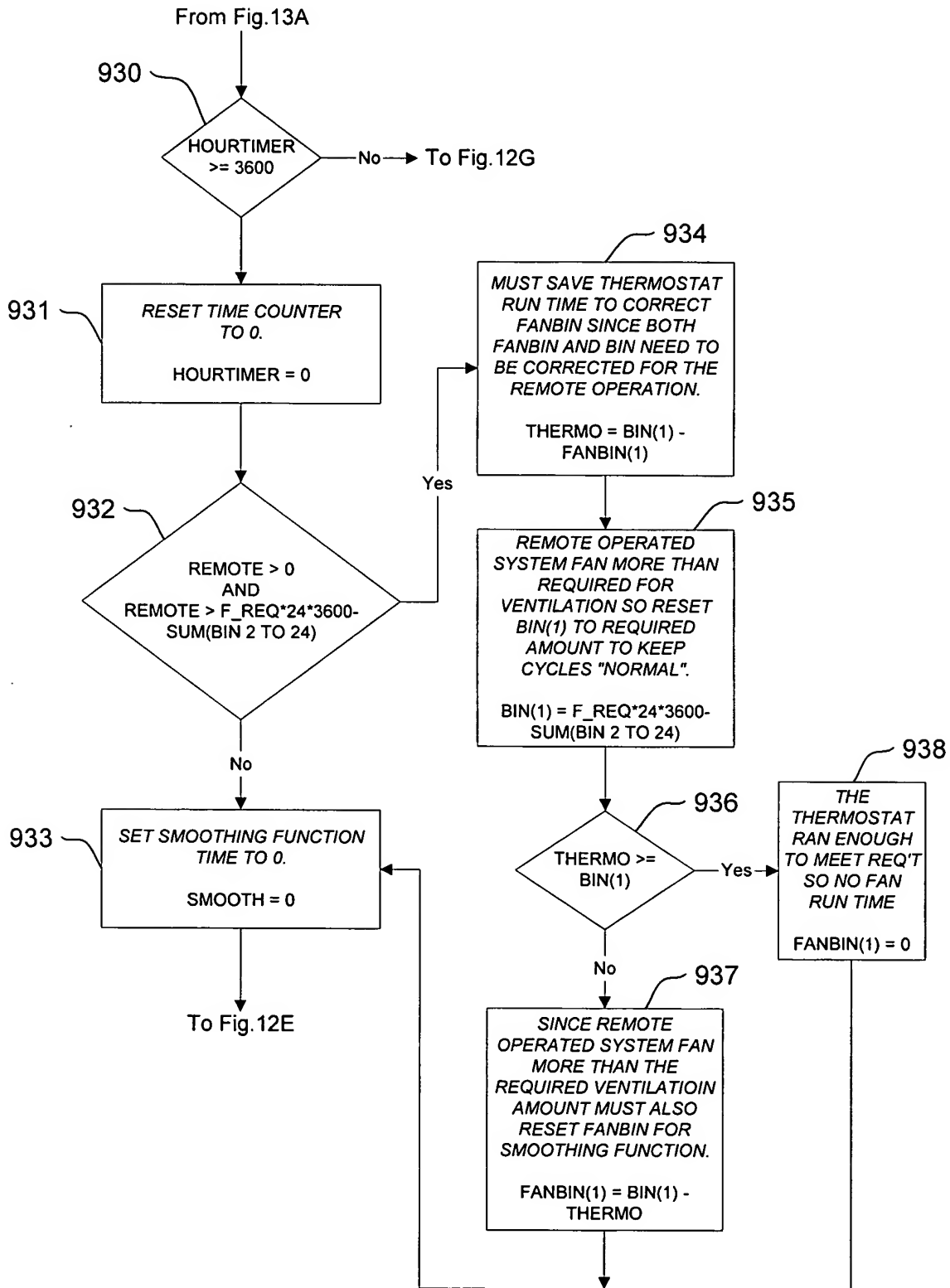


FIG. 12D

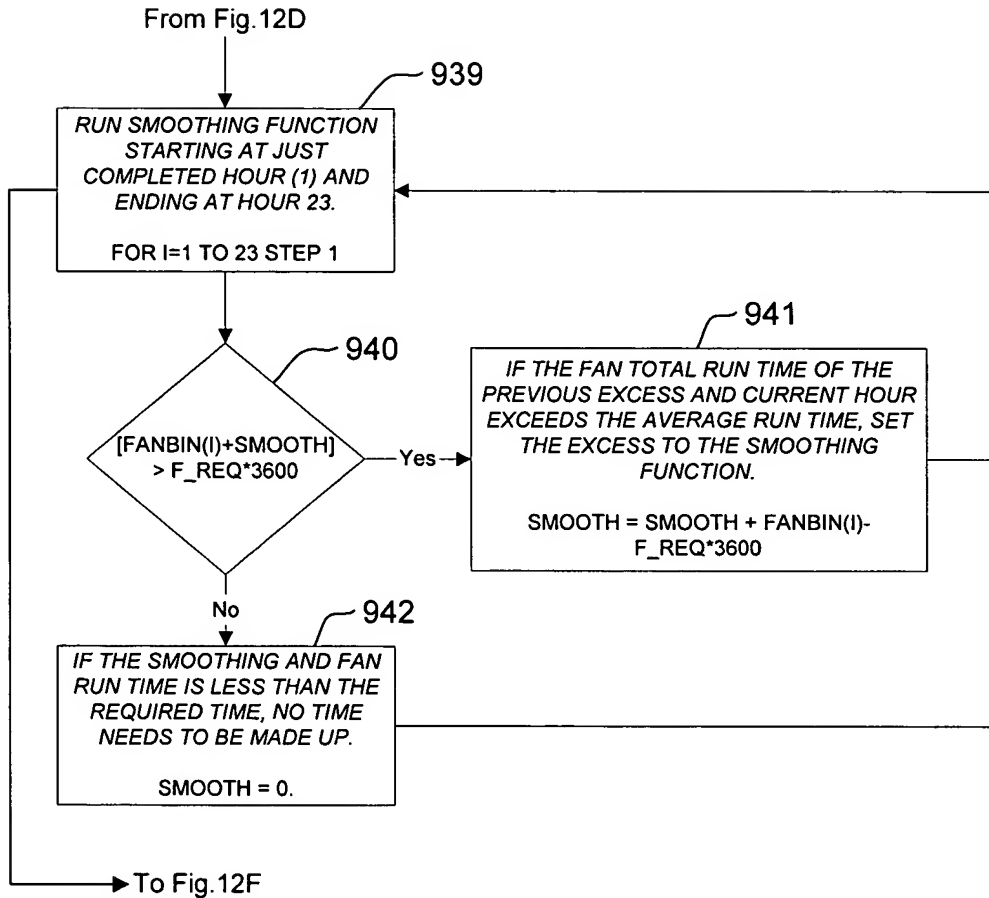


FIG. 12E

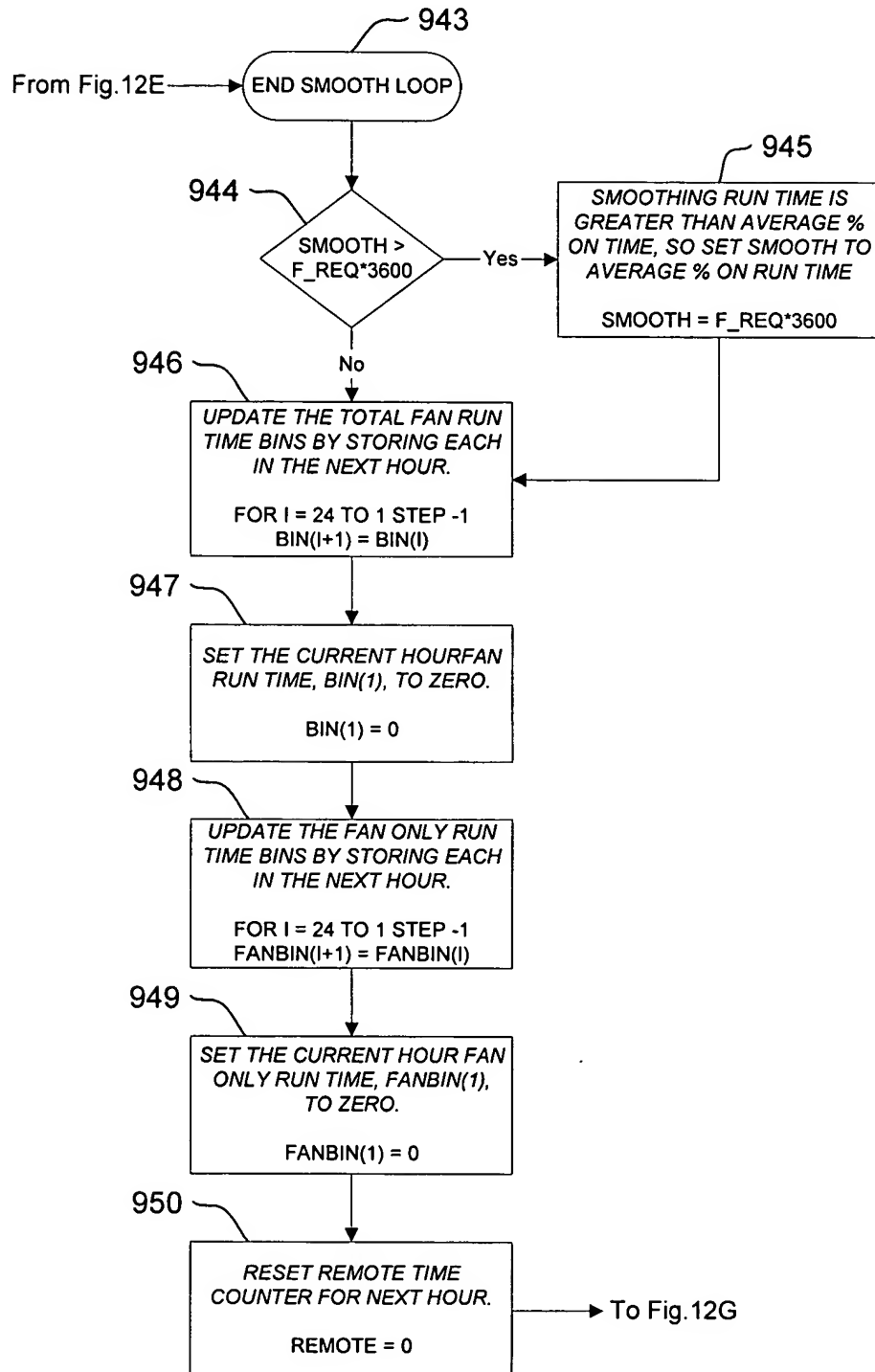


FIG. 12F

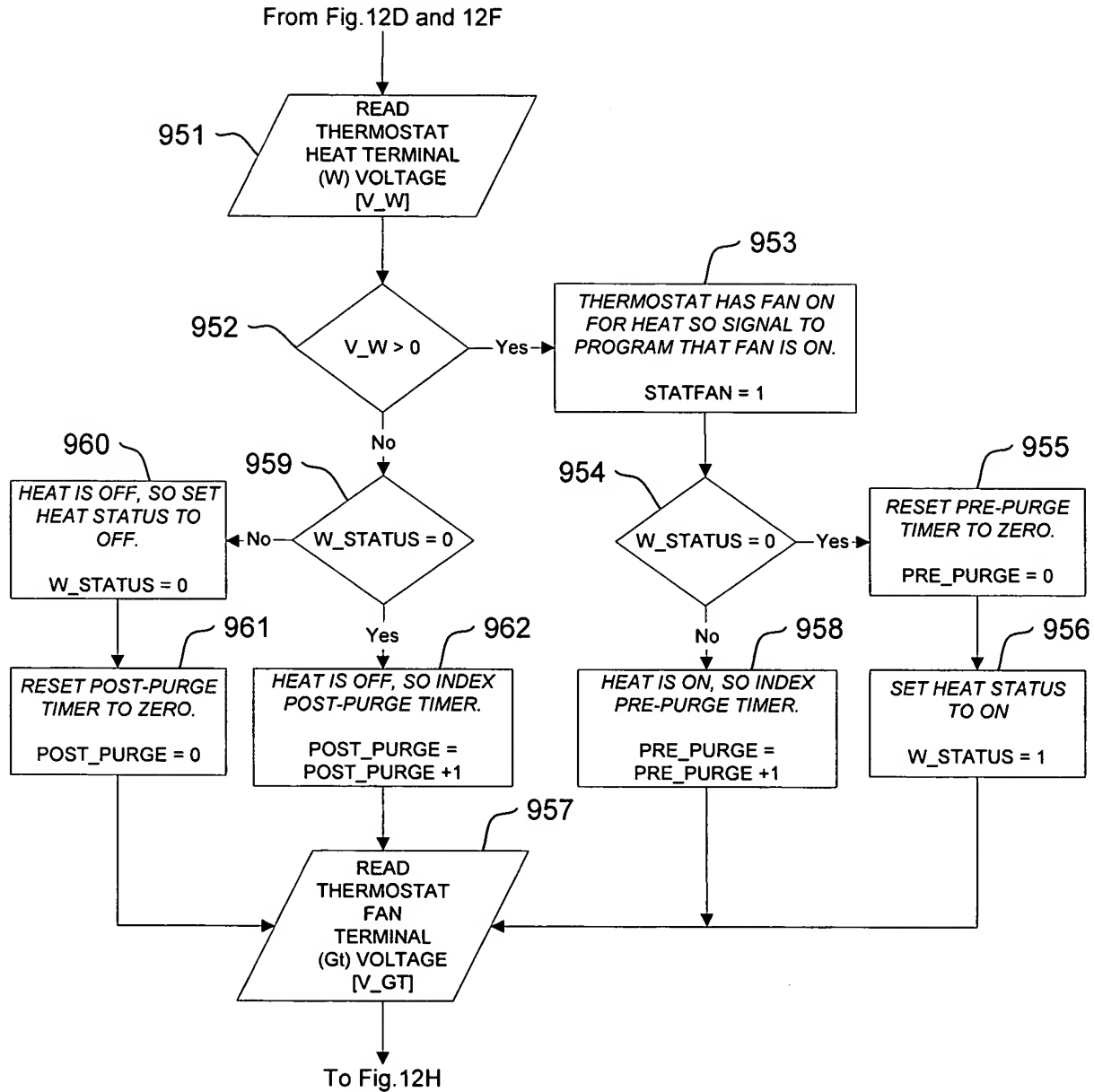


FIG. 12G

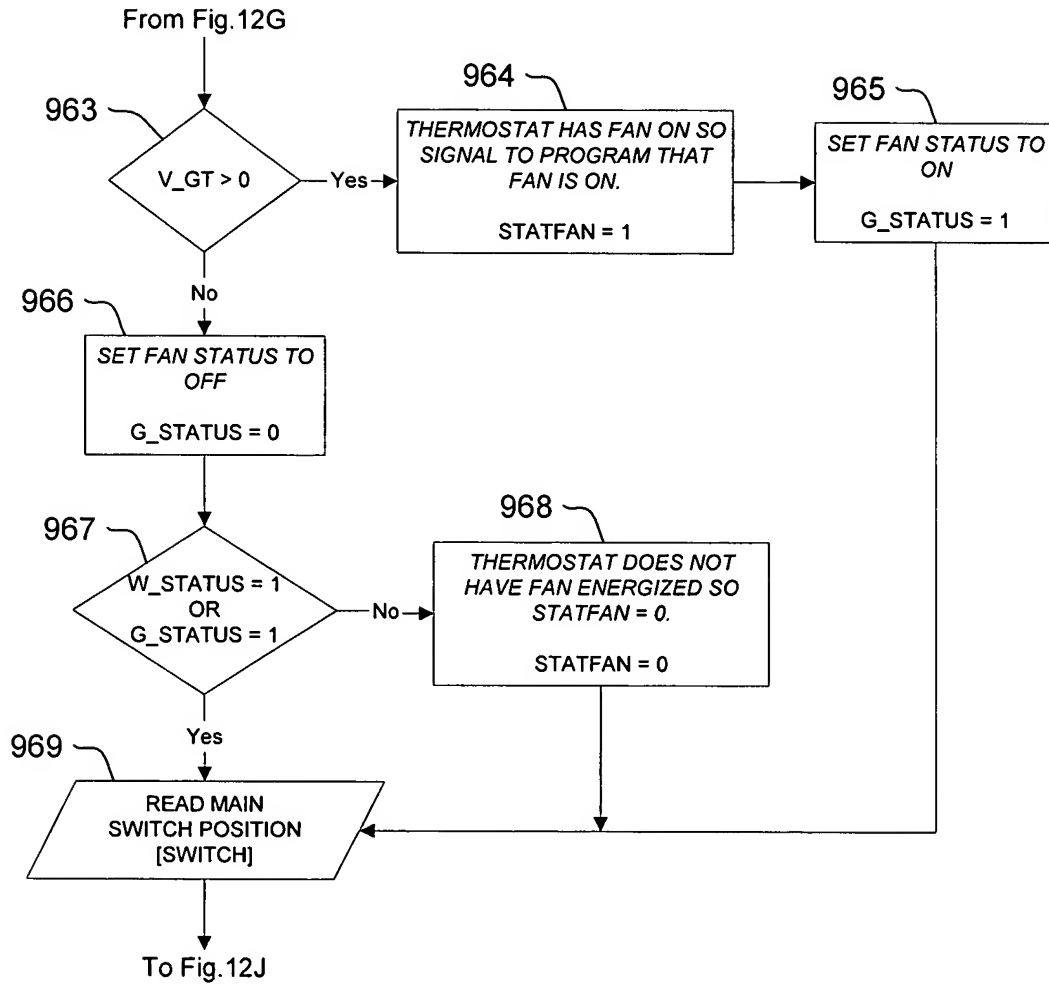


FIG. 12H

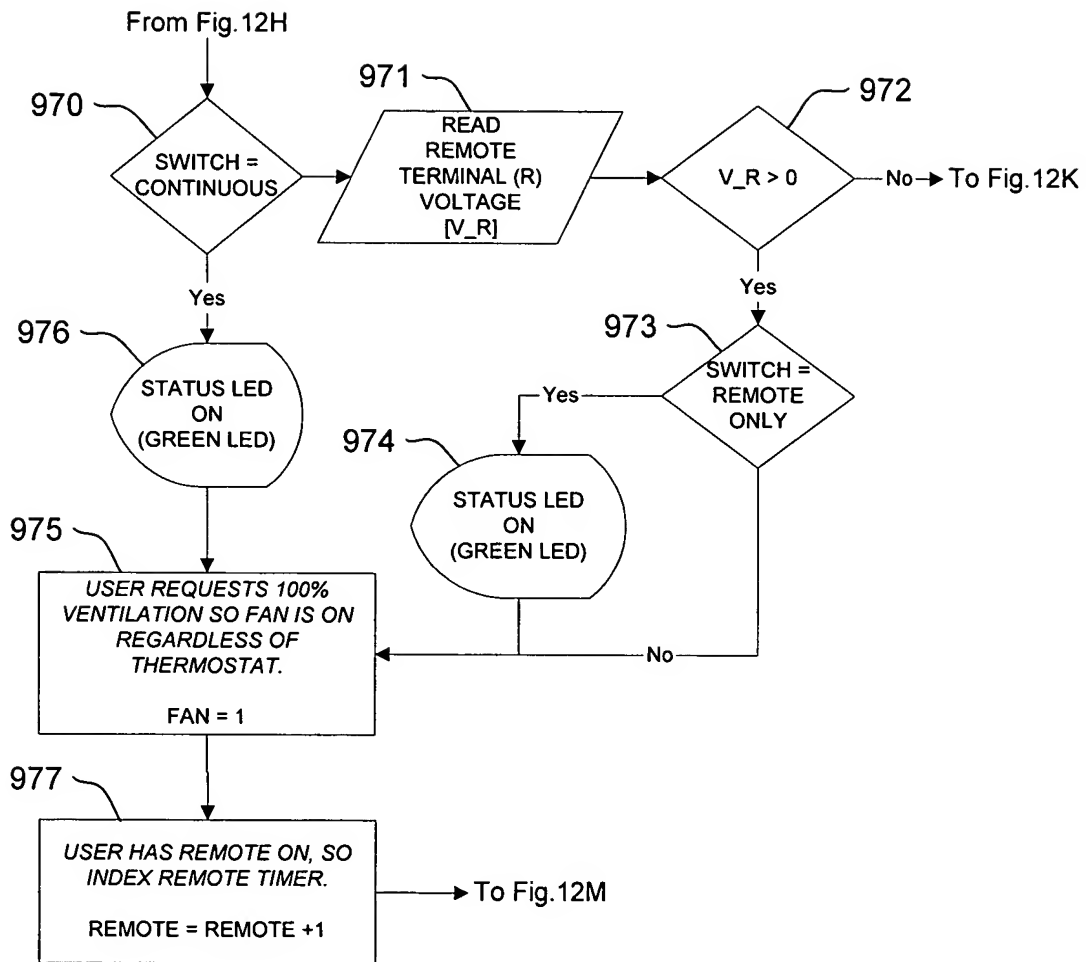


FIG. 12J

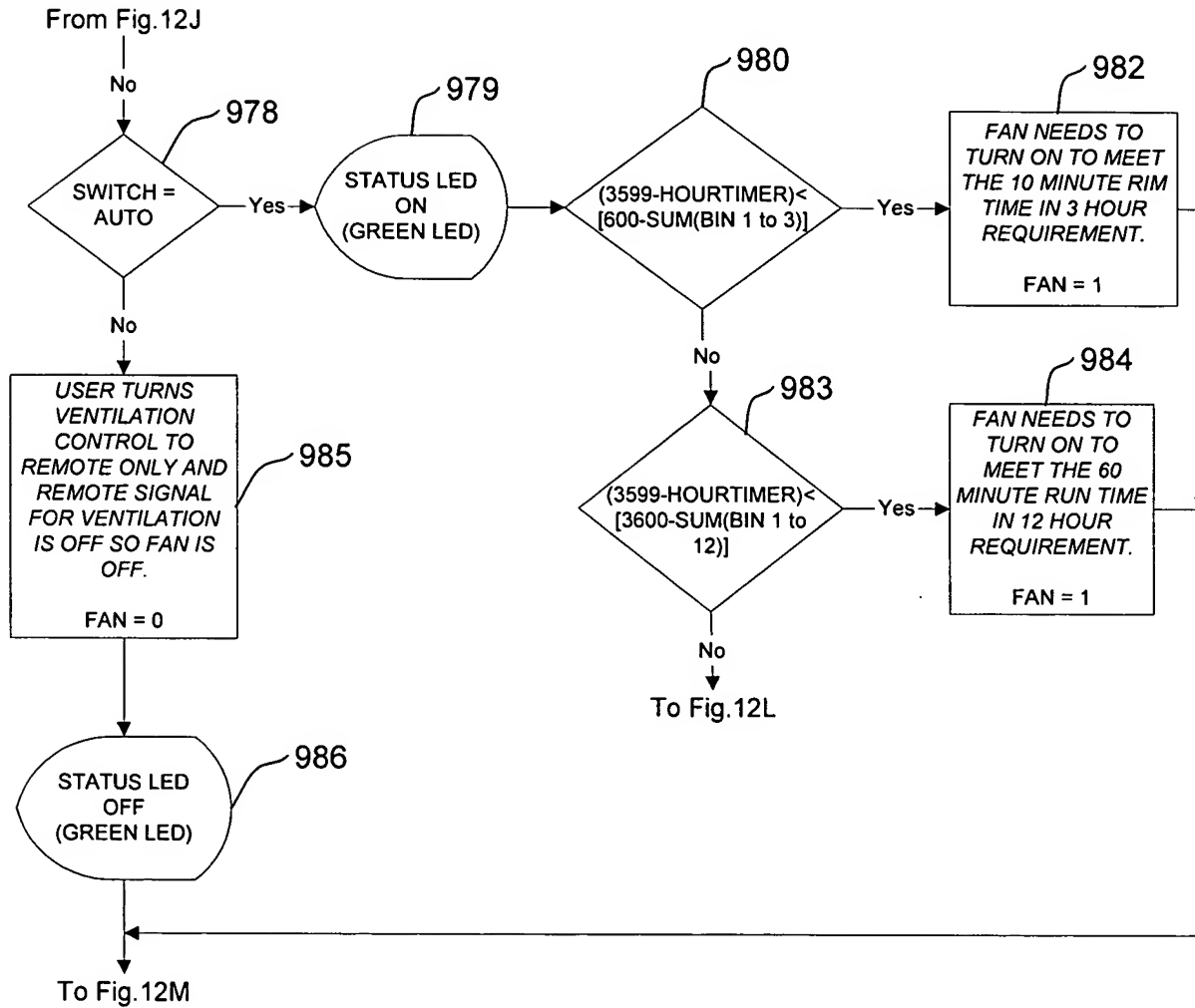


FIG. 12K

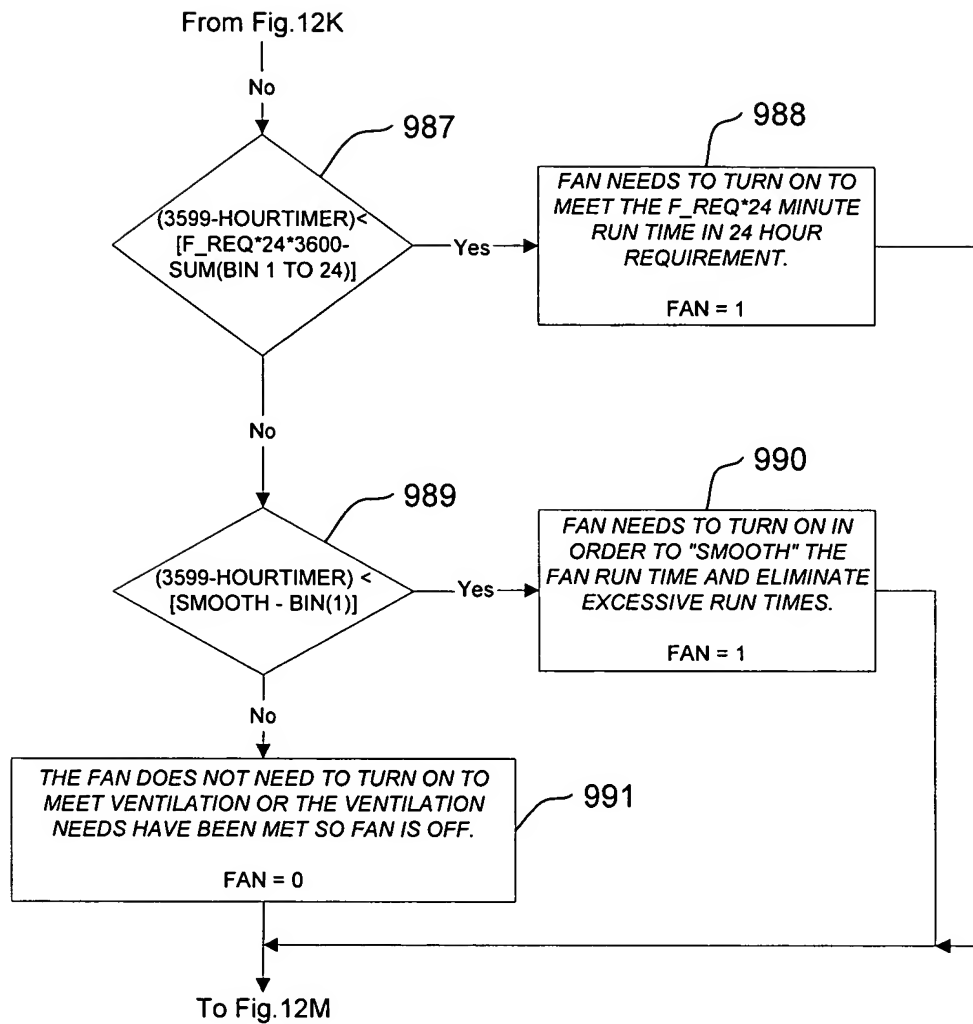


FIG. 12L

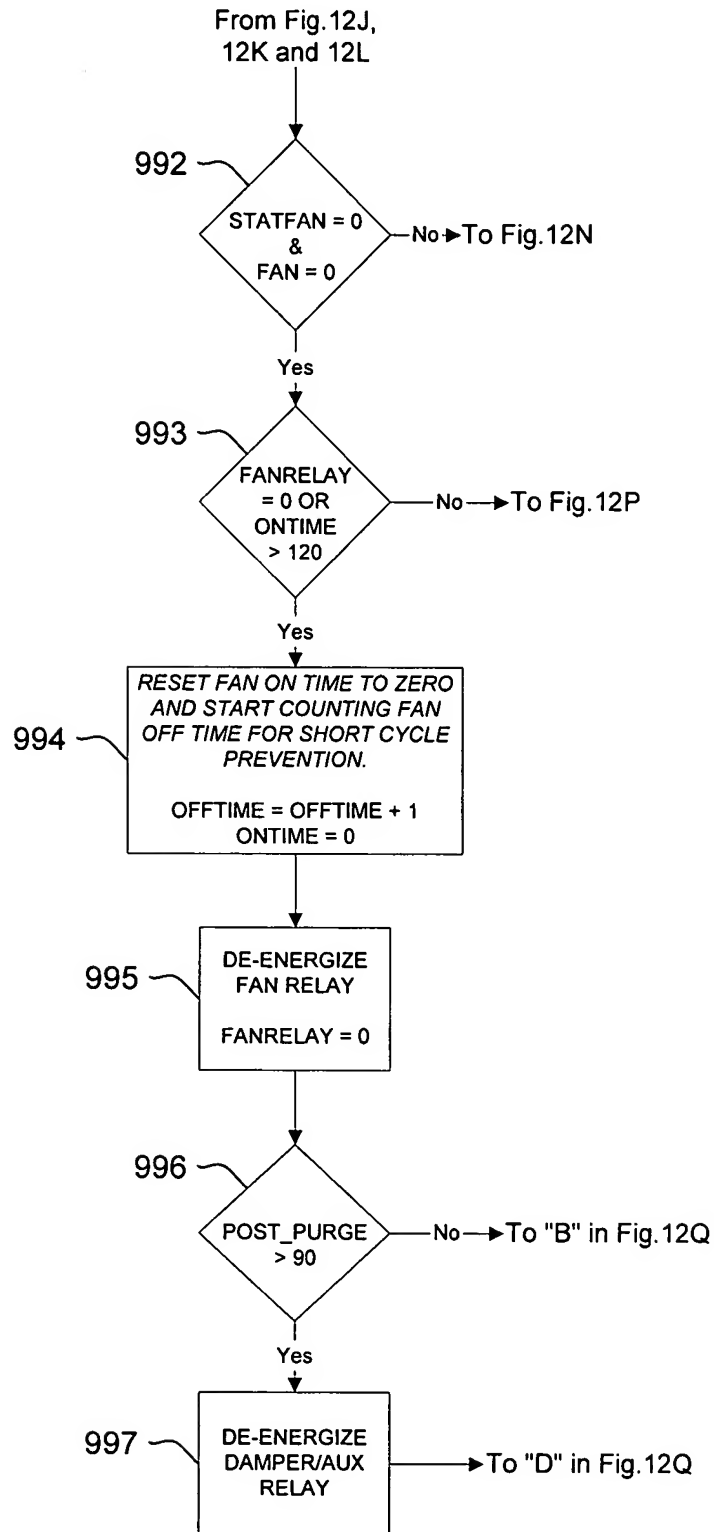


FIG. 12M

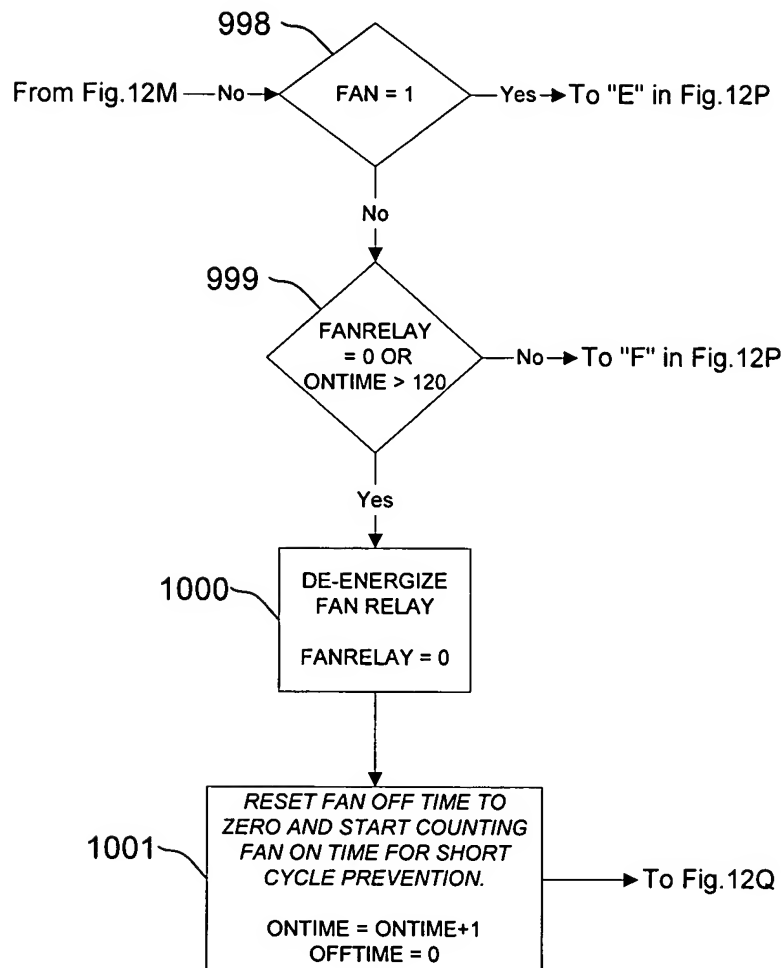


FIG. 12N

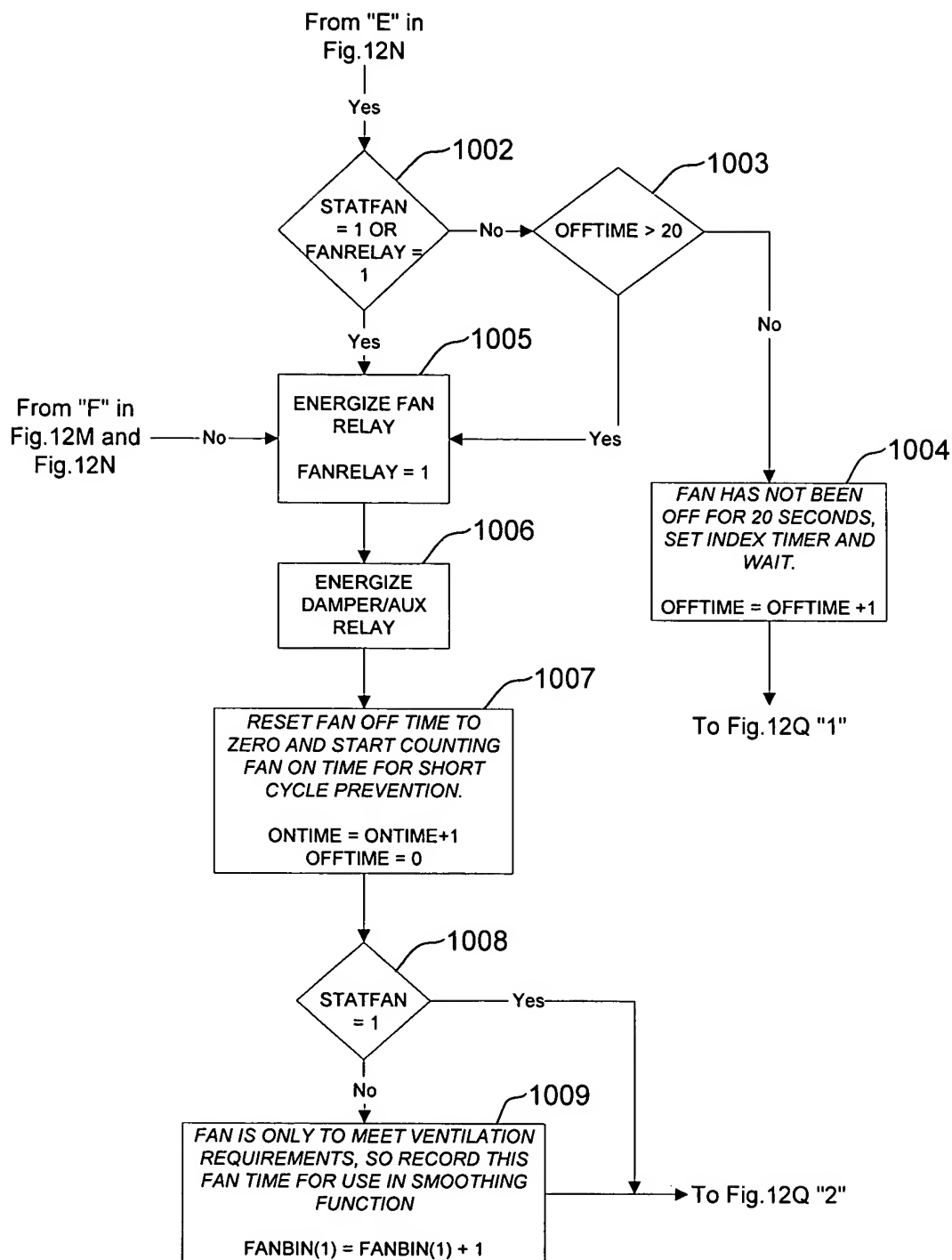


FIG. 12P

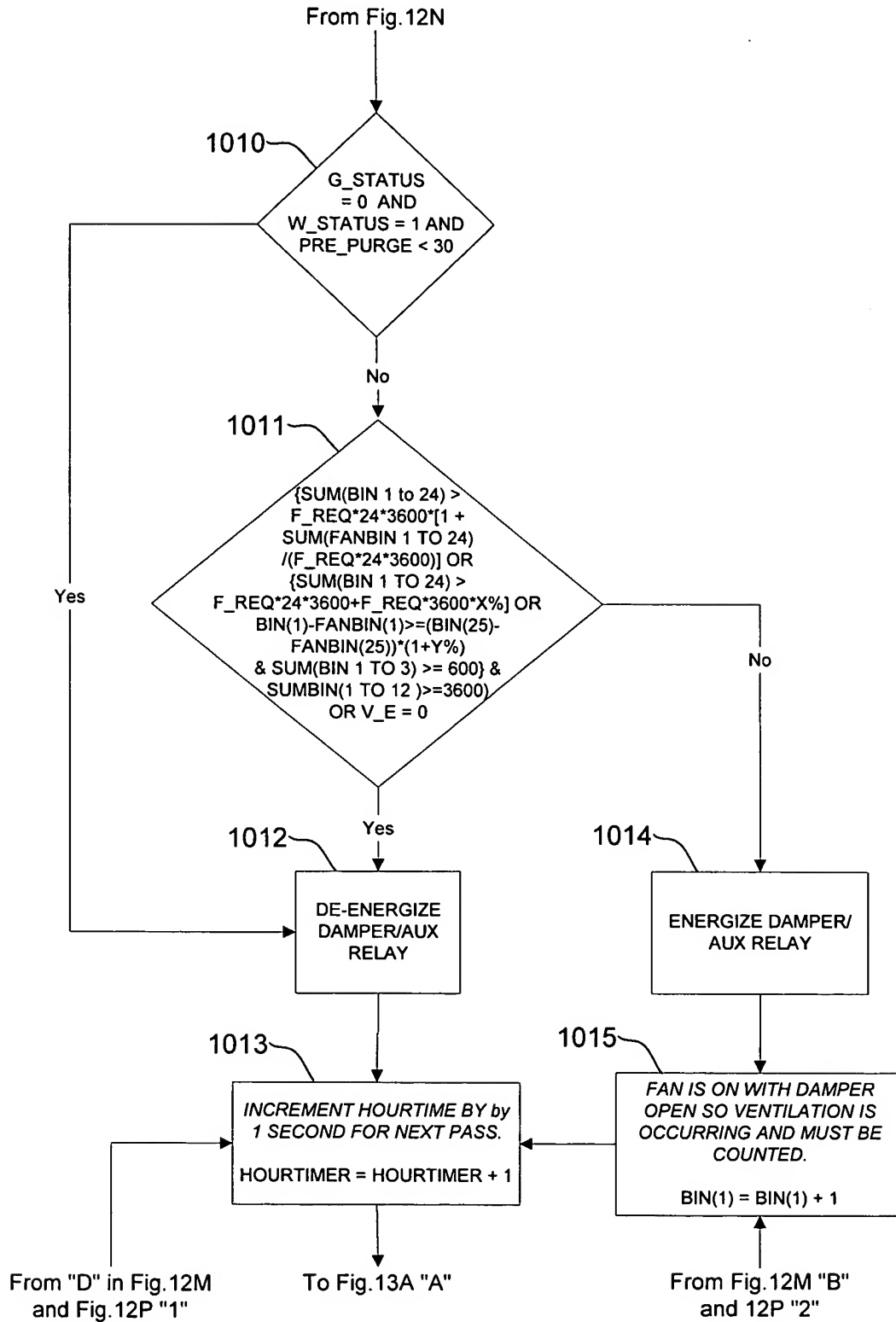


FIG. 12Q

VARIABLE KEY

A - user input, conditioned floor area (ft. sq)
N - user input, number of bedrooms
Q - user input, ventilation rate with fan on (CFM)
f_des - desired percent on time (greater of f_des1 and f_des2)
f_des1 - desired percent on time to meet ASHRAE 62.1 (62-2001) using number of bedrooms
f_des2 - desired percent on time to meet ASHRAE 62.1 (62-2001) using floor area
f_req - required ventilation rate control will meet
bin(i) - set of 24 bins to keep track of ventilation run time per hour
hourtimer - variable to keep track of time in program
V_Gt - voltage on thermostat fan terminal
V_w - voltage on thermostat heat terminal
V_E - voltage on control that determines if the control is "enabled"
statfan - indicates thermostat has the fan on or off (0=fan off)
V_R - remote terminal voltage, indicates homeowner remote ventilation call
fan - indicates control algorithm wants fan off or on for ventilation (0 = off)
fanrelay - indicates that the ventilation control relay is energized, control actually has fan on/off (0=off)
offtime - variable keeps track of time fan has been off
ontime - variable keeps track of time fan has been on
remote - this is a timer to keep track of amount of time per hour remote control is on
undervent_error - indicates that the control will underventilate (0= will not underventilate, 1 = will underventilate)
DIP_1 - user input, ventiaition method (OPEN = ASHRAE 62.2, CLOSED = MN MEC (ASHRAE 62-2001))
DIP_2 - user input, maximum percent on time (OPEN = 60% limit, CLOSED = No Limit [100%]) entered using DIP switch
TEST - user input, momentary test mode button (1 = button pushed, 0 = button not pushed)
Test_mode - indicates whether unit is in test mode (1= in test mode)
test_timer - timer to track amount of time unit is in test mode, used to exit test mode after 180 sec. automatically
W_status - indicates that there is a W call from the thermostat (0 = no W call, 1 = W call)
pre_purge - timer used to make sure control accounts for 30 second pre-purge at start of heat call
post_purge - timer used to make sure system accounts for 90 second post- purge after heat call
G_status - indicates that there is a G call from the thermostat (0 = no G call, 1 = G call)
SWITCH - user input, position of main control switch (REMOTE ONLY, AUTO, or CONTINUOUS)

FIG. 12R

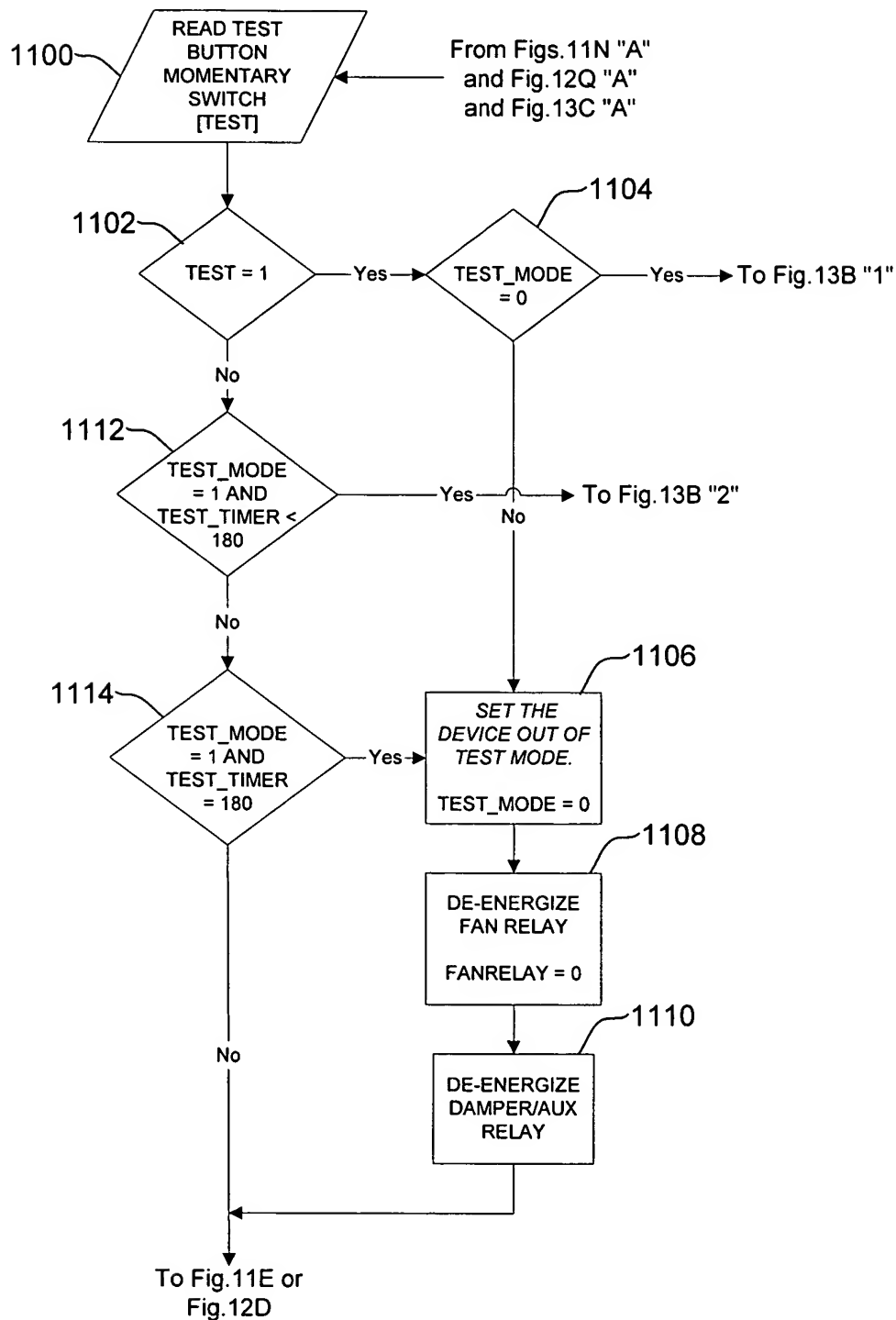


FIG. 13A

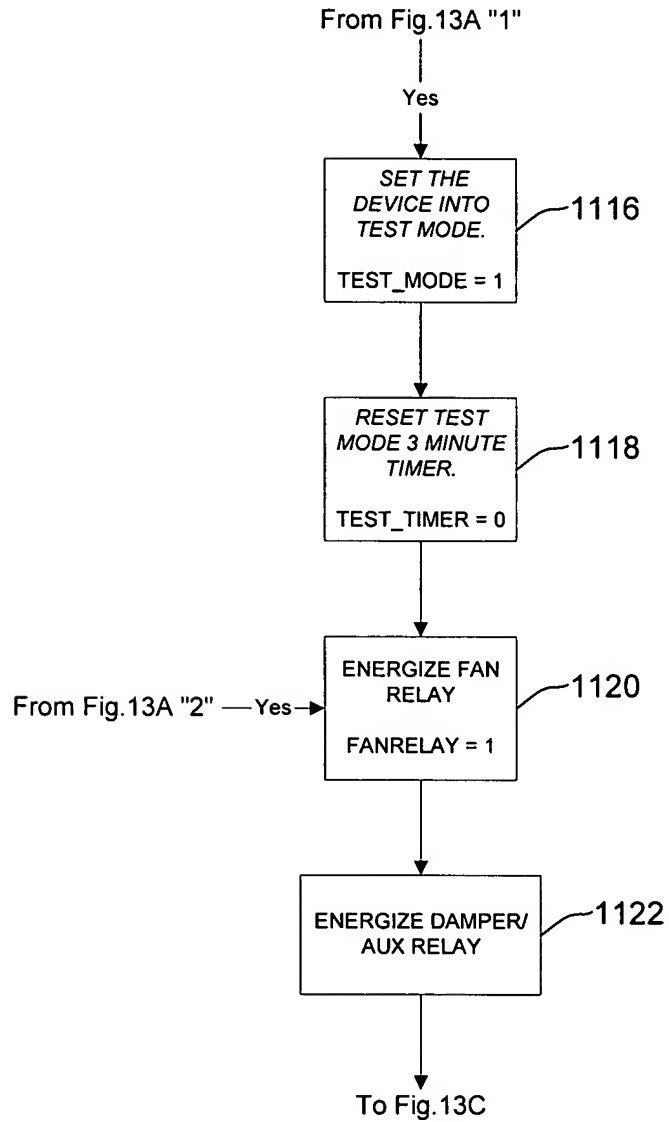


FIG. 13B

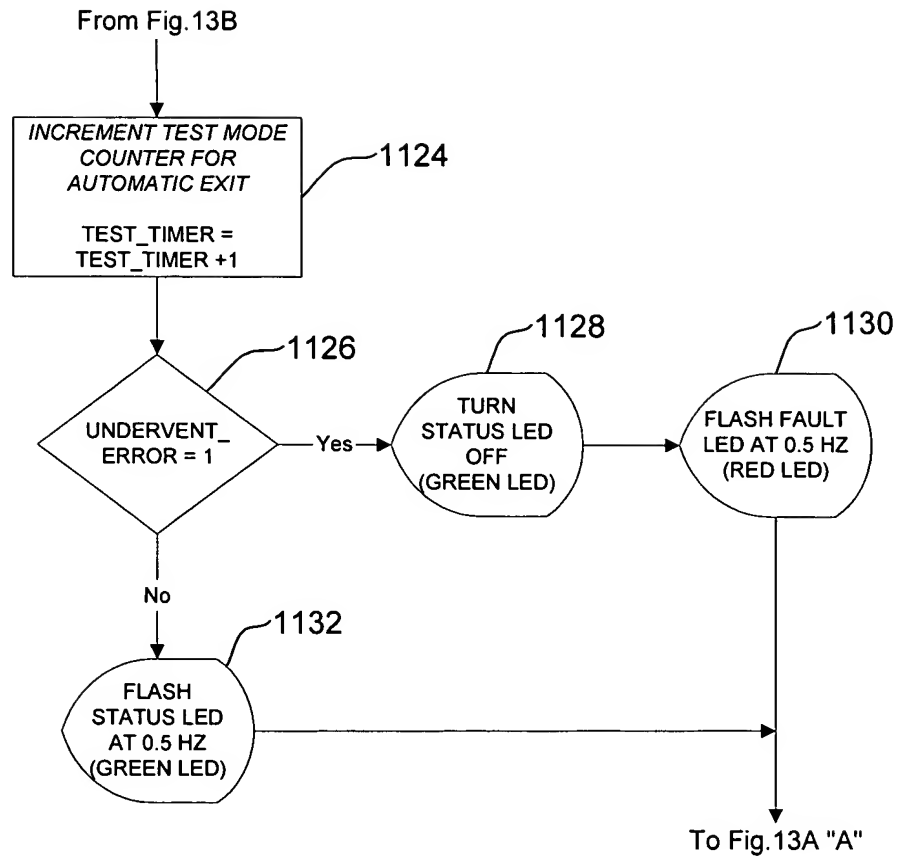


FIG. 13C